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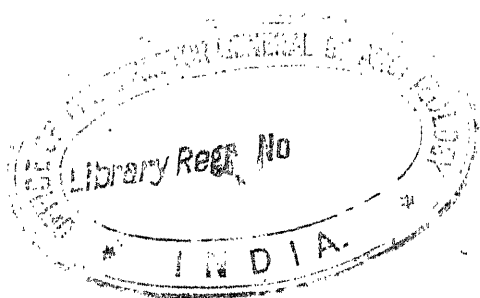
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GOVERNMENT

PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY.



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P.R.G.S.

VOL. VIII.

SESSION 1863-4.

Nos. I. to VI.

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N.B.—Home and Foreign Literary and Scientific Societies whose publications are exchanged with those of the Royal Geographical Society, are requested to note the following abstract of the Regulations of the General Post Office with reference to matter sent by Book Post :—

Every packet must be sent either without a cover, or in a cover open at the ends, so as to admit of the enclosures being removed for examination. For the greater security, however, of the contents, the packet may be tied *across* with string, but must not be sealed, and should have the words "Book Post" marked in legible characters above the address, in all cases in which there is a postal arrangement for the transmission of printed matter between the two countries at reduced rates.

It is also particularly requested that all MSS. intended for publication in the Society's Transactions be written only on one side, for the convenience of printing.

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ELECTED 23RD MAY, 1864.

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PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

SESSION 1863-64.

First Meeting, November 9, 1863.

[ISSUED 31ST DECEMBER, 1863.]

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*William Balfour, Esq.; Lieut. A. J. Clarke (late I.N.); Capt. J. G. Goodenough, R.N.; Sir Joseph Paxton, M.P.; James Walker, Esq.; J. W. Walton, Esq.; Henry Wood, Esq.*

ACCESSIONS and DONATIONS.—Among the numerous Donations to the Library and Map-rooms since the previous Session were—‘A Mining Journey across the Andes,’ by Major F. I. Rickards. ‘The Island of Formosa,’ by R. Swinhoe, Esq. ‘South American Sketches,’ by T. W. Hinchcliffe, Esq. Vol. xvi. and last of the ‘Imperial Dictionary of Universal Biography.’ ‘A Winter in Upper and Lower Egypt,’ by G. A. Hoskins, Esq. Continuations of Transactions of various Societies, &c. &c. Maps of Belgium, on various scales, by M. Van der Maelen. Continuation of Coella’s Atlas, on 10 sheets. Geological map of Sweden, on 5 sheets. Philip’s Atlas, Part 17. Angola, on 2 sheets, by Visconde de Bandeira; presented by the Rev. R. T. Lowe. ‘Iceland, its Scenes and Sagas,’ by Sabine Baring Gould, M.A., by the Assistant Secretary; Maps of Province of Canterbury, by Dr. Haast; and Island of Java, by W. F. Versteeg, &c. &c.

EXHIBITIONS.—View of the Snow Mountains of Kilima-njaro, Eastern Africa. A Map of Scinde Railway, showing a general plan of the line; presented by J. Brunton, Esq., Engineer to the Company. Two ancient Maps on vellum, lithographed from an atlas to Ptolemy’s Geography of 27 maps on vellum by Arnold Buckinck. Rome, 1478; presented by Hudson Gurney, Esq.

In opening the Session, the President, SIR RODERICK MURCHISON, made the following Address:—

Now that we are re-assembled in the metropolis for this our thirty-fourth Session, we commence our operations with a consideration of several subjects of great interest relating to Africa. Whilst we are

all waiting with impatience for the issue of that work which will bring out the interesting details of those great and successful adventures, by which our countrymen Speke and Grant, traversing tropical regions never before visited by any European, determined the main sources of the Nile, we naturally begin by doing honour to the Hanoverian nobleman, the Baron von Decken (now sitting near me), who, fitting out, at his own expense, a scientific expedition, has explored the loftiest mountain known to us in Eastern Africa. The German missionary Rebmann, who had reached the foot of that mountain, had indeed informed us that, both from what he heard and what he saw at a distance, this mountain was capped by snow. His story was, however, met by scepticism on the part of many persons, including myself, inasmuch as we had then no good evidence to sustain the belief that any portion of the mainland to the north-west of Zanzibar, so near to the coast and almost under the Equator, attained a sufficient altitude to account for the existence of snow upon its summit. Now, Baron von Decken, after two ascents, has, by his perseverance and energy, swept away my doubts; for, after he had examined the flanks of that mountain, and laid down its geographical features, he ascended it to very nearly 14,000 feet above the sea, as determined by both barometer and boiling-water, and having by trigonometrical measurements determined that the summit exceeds 20,000 feet in height, and having ascertained that, when he visited the mountain, the snow-line descended to below 16,000 feet, the snow falling during a short interval to below 13,000 feet, he has satisfactorily established and set before us a grand and new phenomenon in the physical geography of Africa.

It is not to be forgotten that, before he began his journeys to Kilima-njaro, Baron von Decken made a gallant endeavour to proceed from Kiloa, and reach the spot in the interior where Roscher was murdered, in the hope of obtaining the papers of that intrepid traveller, but was compelled to relinquish his object owing to the desertion of his porters and the hostility of the Arab traders.

In his chief expedition, Baron von Decken, meeting with my lamented friend the late Mr. Richard Thornton, who went out with Dr. Livingstone, but who was at that time at Zanzibar, engaged that able and zealous young geologist to accompany him; and I was happy to learn that poor Mr. Thornton, to whose merits I recently called the public attention, was of great use to Baron von Decken in aiding in the construction of the map, an outline of which you now see before you, and which will be rendered much more complete when the calculations, which Mr. Thornton worked out before he lost his life on the Zambesi, shall have been received.

In the mean time I may state that Baron von Decken having submitted to me some specimens of rocks which he has brought to Europe, I find that, whilst on the lower flanks of Kilima-njaro there are micaceous gneissic rocks, hard calcareous sandstone, and felspathic rocks, the higher zones of the mountain consist of unquestionable igneous rocks of older date below, with obsidian and trachyte at the highest altitudes reached; thus proving that the lofty summit has been raised by volcanic action, though there are no proofs of any eruption in the modern period.

But, Gentlemen, the Baron von Decken is not a man to do things by halves. Although what he has already achieved is sufficient to establish a high reputation among African travellers, he is not content with having mastered the monster Kilima-njaro, but is resolved to grapple with its rival peak, called Kenia, which, although not yet reached by any geographer, has been placed in Arrowsmith's last map upon the very line of the Equator, and about 200 miles to the north of Kilima-njaro.

Having left behind him one of his companions, Dr. Kärsten, an accomplished chemist and astronomer, and who is to rejoin him at Zanzibar, Baron von Decken has come to our country to equip (I speak in a geographical, not an international sense)—to equip himself, at considerable cost, with a long river steamer, which, though it be built of iron, is not to be a *ram*, nor is it to have any warlike contrivances. In this vessel he purposes to ascend one of the rivers in or near to Formosa Bay (possibly the Juba), and so penetrate rapidly into the interior, either towards Mount Kenia, or, if foiled in that object, to Gondokoro *viâ* Kaffa.

I must here mention a circumstance which is much to the credit of the noble Duke who now worthily presides over the Admiralty. Baron von Decken had expressed to me his hope that, in passing his vessel over the bar of the river he chose to ascend, he might be assisted by one of the British cruisers in those seas; and on my representing this wish to the Duke of Somerset, his Grace at once acceded to the request, and orders were sent to the Admiral at the station of the Cape to lend all necessary aid to this meritorious traveller.

I may also take this opportunity of announcing that Baron von Decken would be glad to receive the services, in his forthcoming expedition, of some competent young artist to sketch the landscape as well as the inhabitants and wild animals of the regions he may traverse.

Such devotion as that which the Baron von Decken has shown, and is showing, in the cause of African discovery, calls indeed for

our warm commendation; and I feel certain that you all wish God speed and a successful issue to the chivalrous endeavours of a Hanoverian nobleman, who, rivalling our foremost travellers, reminds me of those days when his countrymen in our own German Legion won the praise and regard of every British officer, and brings at once to my mind those great recent African discoveries in which Barth, Overweg, and Vogel have been so eminently distinguished as members of British expeditions. I will only add, what you will be happy to learn, that the Council have this day elected Baron Charles von Decken an Honorary Corresponding Member of the Royal Geographical Society.

By the letter of that fine young man the late Mr. Richard Thornton, which will be read, and which was written shortly before his lamented death, you will perceive how hard he worked to develop the mineral structure, as well as the physical geography, not only of the tracts around Kilima-njaro, but also of the countries watered by the Zambesi and Shiré, or what may well be called the great Livingstone region. His loss is deeply to be deplored, as it is to be feared that some of his conclusions were not matured when he was seized with his last and fatal illness.

As Mr. Charles Livingstone and Dr. Kirk, both members of the Livingstone Expedition, are once more happily among us, they will, I hope, in awaiting the arrival of their celebrated chief, convey to us much valuable information respecting the countries of the Zambesi and the Shiré.

Short as is the letter referring to the last operations of Dr. Baikie, it cannot but excite in us an earnest desire to hear more of his last enterprise, and to learn that this accredited envoy of our Government, who has long been doing good service in introducing habits of honest trade among the native chiefs high up the Niger, has, in penetrating far into the interior, obtained important fresh knowledge, and has at the same time widely extended our good name among the natives of Africa.

Let us hope that, under such humanising influences, the barbarous conduct of the chief who murdered the accomplished and amiable Dr. Vogel may never be repeated; whilst I am sure you will listen with deep interest to the lively description of the habits of the natives which poor young Vogel gives us, in the familiar letters to his mother and Mr. Hinde, which will be brought before you.

I may now announce that I have received a long letter from Mrs. Petherick, dated Khartum, July 26, which gives a very touching narrative of the dangers and difficulties which beset her husband

and herself, first on the White Nile far above Khartum, and afterwards in the endeavour to travel westwards, amid many perils and disasters, by Khol and Ngam Gara to the former ivory station of Mr. Petherick, or Nyam-Bara, whence they passed through a most interesting country to Gondokoro. The letter is written with much feeling, and makes known to us that Mr. Petherick was lying too unwell at Khartum to be able to write himself.

I am also bound to make known that Mrs. Petherick states that her husband had rendered himself unpopular in that region by his efforts to check the trade in slaves.

This letter, or portions of it, may be read before the Society as soon as we receive advices from Mr. Petherick explanatory of his geographical researches. The state of his health, we must presume, has prevented him from transmitting to us, as we had a right to expect before now, some account of his travels; particularly as I learn from one of his companions, Mr. Murie, an able naturalist, who has arrived in England, and who is present on this occasion, that many astronomical observations were made during the expedition, all of which were registered in books. Although the main object for which we subscribed our money—the succour of Speke and Grant—was, through the disasters of Petherick, to a great extent delayed, I trust that we may yet be furnished with such an amount of geographical data, particularly in reference to the hitherto untravelled country between Nyam-Bara and Gondokoro, as will satisfy geographers that the pecuniary means which they placed at the disposal of Mr. Petherick have not been expended without affording us some good results.

Lastly, I have to announce that our associate, Mr. Tinné, who is present, has received letters of the 1st July from his relatives the Dutch ladies, whose travels have excited so much interest; and, if time permit, he will communicate an outline of this correspondence.

The first Paper read was—

1. *On the Snowy Mountains of Eastern Equatorial Africa.* By the Baron CHARLES VON DECKEN.

AFTER apologising for the meagreness of the present communication, consequent on all his papers being at Zanzibar, the author mentioned that, on leaving Mombas, he proceeded southward along the coast to Wanga, and thence struck westward up the river Umba. On reaching the Ugono range, 5000 feet high, he found himself among a well-formed race, sufficiently civilized to smelt iron—very rudely, certainly—but with sufficient success to enable them to

make no contemptible weapons. He experienced in several places much opposition from the natives, who had got a notion that the bare presence of a European would prove fatal to their cattle. On leaving the Wa-Ugono, or people of Ugono, he coasted Lake Jipé on the west side (having previously, in company with Mr. Thornton, traversed its western shores), and, on reaching the northern end, discovered that the river Daffeta, after entering it from the elevated tract beyond, left it within a mile or two of its entrance, the course of the river turning abruptly at almost a right angle. The next point was the Aruscha range, about 4000 feet high, to the westward of which, at a considerable distance, was another lofty range. This would probably be found to be the eastern watershed of Lake Victoria Nyanza. From this point there was a fine view of the two peaks of Kilima-njaro, a sketch of whose snowy summits was exhibited. He now fell in with two minor kingdoms, in which, after going through various ceremonies, such as drinking blood with the chiefs, &c., he found himself about to be hampered by the untrustworthiness which is so characteristic of the African tribes, and therefore pushed forward to ascend the mountain. Here, accompanied by Dr. Kärsten, an accomplished astronomical observer, he encamped the first night at 6000 feet, the next at 11,000, in heavy rain, which, on the weather clearing off in the morning, proved to have been snow, at an elevation of about 13,000 feet. This disappeared by about 9 A.M., but left a clearly defined limit of what seemed to be perpetual snow at about 17,000 feet, the triangulations having previously given the main peak an elevation of 20,065 feet, and the other upwards of 17,000. Still advancing upwards, he attained a height of 13,900 feet, when his companions having given out, owing to the increasing rarefaction of the atmosphere, he was compelled to retrace his steps. He then returned through the Djagga country to the coast. The paper concluded by briefly detailing the alternative routes which Baron von Decken had sketched out for his future exploration. One of the most interesting features of Baron von Decken's paper was a detailed account of a fly, called by the natives "Donderobo," whose bite, as deadly as that of the better known Tsetse, was fatal to asses and goats only; involving serious inconvenience and even danger to the expedition, by the destruction of the draught asses of the caravan. The effect of the poison seemed to be to produce tubercular deposit, following immediately upon acute inflammation.

The PRESIDENT having invited remarks—

Mr. MACQUEEN said it was satisfactory indeed to find Baron von Decken

confirming in such a clear and decided manner the information conveyed to us fifteen years ago by those indefatigable and intelligent men the Church missionaries, which, though clearly and minutely given, has for many years been distrusted. In reference to the height of these mountains, he might remark that every 5000 feet in height gives a line of vision of 83 geographical miles when not obstructed by intermediate heights. Consequently, the height, as estimated, gave a circumference of vision of 332 geographical miles, and by that of Baron Decken 340 miles, which shows at once the error of those who place these mountains so near to the coast as has been in some instances done.

It was satisfactory to him to have his estimates so nearly confirmed by the actual observations of the Baron. He wished to draw the Baron's particular attention to Dr. Krapf's journey from Mombas to Wa-Mbané. In journeying along the north side of those mountains, he crossed a considerable but clear, cold stream, the river Tzavoi, which rises on the north-east face of Kilimanjaro. Hereabouts the lower mountain hid the higher from his view. Soon after the higher with its snow-covered top came in view, and two days' journey farther to the westward he crossed the river Adi, a fine stream, but then very low. This stream rises in the south corner of a very mountainous range to the north-west. From this river he proceeded through the high land of Yata in Wa-Mbané.

The river Duna, which he next visited, at the point he saw it was from 150 to 200 yards wide and 7 feet deep, with a current of about 4 miles per hour. This was at the very close of the dry season, yet here was a river of very considerable magnitude, running into the Bay of Formosa. It rises on the north side of Mount Kenia. At Rivoi's village Dr. Krapf saw the snow-clad Kenia bearing about N.W. by W., and to the south of it, on the bearing of W.N.W., he saw another mountain, with two dome-like peaks at each end, also covered with snow. From the small angle at which this range of mountains was seen, its distance west must have been somewhat greater than the other. On the west side of Mount Kenia there is a lake, from which issues a river said to run to Massûr (Egypt). At some distance west of Kilimanjaro Dr. Krapf describes another mountain, at least 18,000 feet high. Beyond this is Bahuringe (? Baringa of Speke and Grant. [Ed.])

In reply to Captain Maury, BARON VON DECKEN said his first ascent was made in the month of June, and the second (that detailed before the Meeting) about the end of November. The rainy season commenced in the month of June, and extended through July, August, and September; but near the Djagga the rainy season extended over nearly ten months of the year. It was only for two months that there was really no rain; during the other ten months there was rain every day. The rain nearly always fell in the evening, and commenced with a heavy north-east wind.

CAPTAIN MAURY said the rains at Pará, at the mouth of the Amazon, which was still nearer to the Equator, had a similar feature of regularity about them. There, however, they commenced about two in the afternoon, and so regularly, that people regulated their appointments by them, saying, "Come to me half-an-hour before the rain." In these explorations it was a matter of interest to find out not only the prevailing direction of the winds, but the quantity of rain that fell, and the time of day as well as the season of the year in which it fell. Because it must be obvious to every one that there is a close connection between the meteorological phenomena, and the fauna and flora of every latitude—one was the complement of the other; therefore, when a traveller gave us information respecting the one, we could draw general conclusions with regard to the other. He recollected listening, at a previous meeting, to a paper on Madagascar, in which the author stated that one of the principal features that attracted his attention was the remarkable development of vegetation, so different from the vegetation in the corresponding latitudes on

the coast of the mainland of Africa. Knowing this fact, viz. that the flora of Madagascar is very different from the flora of the neighbouring coast, between the same parallels, we know also that the fauna must be very different, because the flora is the foundation, as it were, upon which rests the fauna of any particular region. When we come to account for this remarkable difference in the vegetation of the two regions, we find that Madagascar is for a certain season of the year in the line of the south-east trade-winds, which come charged with moisture; and the moisture being drawn off by the mountains of Madagascar, the atmosphere is left comparatively dry, and in this state it makes its way to the mainland. One most interesting feature in these African explorations was the glimpses which we obtained of the meteorological conditions of that unknown country as bearing upon its flora and fauna. Thus there was no equatorial region in the world, except Peru, where the rains were so scanty as on the eastern coast of Africa, in the region of the head-waters of the Nile. According to the rain-gauges of Grant and Speke, the rainfall throughout the year is not greater on the average than that of England. It was the knowledge of these facts which enabled us to form some sort of estimate as to what the country in question is fit for. Where there is no moisture, there is sterility, as in the deserts of Sahara; on the contrary, where there is moisture, as in the valley of the Amazon and in Madagascar, there is a profusion of vegetation. Applying this rule, then, to the newly-discovered regions of Central Africa, he should say that they were eminently fitted for the cultivation of coffee, tobacco, and perhaps sugar. With regard to the Snowy Mountains, it appeared to him that the snow must be due to the south-east trade-wind, which, not being turned aside to supply the south-west monsoon of India, keeps up the stream of moisture which the Baron spoke of as lasting nearly all the year round, and which would keep the mountains covered with snow. One consequence of this steady fall of moisture and accumulation of snow was to be found a little farther to the north. The reservoirs of the Nile consist of lakes, which feed that river precisely as the reservoirs above Niagara feed the St. Lawrence, keeping them nearly at the same level, and precisely as the reservoirs in Minnesota feed the upper waters of the Mississippi. When we compare the two branches of the Nile, one fed by lakes and the other by snows, with the two great branches of the Mississippi, we find that when the floods on the Ohio are coincident with the melting of the snows on the Missouri, we have tremendous inundations in the lower country, just as we had the other day on the Nile, in consequence, no doubt, of a precisely similar coincidence with regard to its two main branches. But in all these explorations it is frequently as desirable to know what trees, plants, birds, and mammals the traveller does not see as to know what he does see. Negative information is often most important.

In reply to a series of questions by Mr. Crawford, BARON VON DECKEN said there were no horses nor donkeys in the region of Kilima-njaro; they only came with caravans from the coast. At Djagga he was the first person who brought a donkey there, and it made more impression upon the natives than the presence of white men. Cattle were plentiful, of the same species nearly as those in the Gallas country. There were goats and two kinds of sheep, one with a long tail and the other with a fat tail. Turkish corn, a species of potato, and bananas were grown. He found bananas at an elevation of 5000 feet. Cocoa-nuts he never found more than two days from the coast. The sugar-cane grew in abundance in the lower country, but not in the Djagga. He saw no wild coffee.

SIR EDWARD BELCHER said he had visited nearly every part of the coast of Equatorial Africa on the west side, and his observations agreed with those of Captain Maury as to the limited rainfall. He would ask at what altitude did the Baron experience these constant rains?

BARON VON DECKEN.—It was nearly 5000 feet.

SIR EDWARD BELCHER said this could form no rule with respect to the condition of things on the sea level, where he was inclined to think that very little rain might fall when this constant moisture was experienced at such an elevation. It was indeed above the cloud level; and those who had visited places on and near to the Equator, as at Borneo and Penang, knew, even at 2000 feet above the sea level, that in the dry season rain-clouds and extreme cold prevailed.

The PRESIDENT remarked that the existence of the Snowy Mountains had been stoutly contested so recently as the preceding Saturday by a well-known geographer. To have physical proofs brought before them for the first time that these mountains were covered with snow, invested the question with considerable importance. The measurement of the altitude would sufficiently account for the fact.

The EARL OF DONOUGHMORE said as the fly which had been described was fatal to asses, he presumed that mules would run the same danger; therefore he should like to ask whether the Baron considered the country suitable for camels. In exploring this region it appeared that the great difficulty travellers had to contend with was the impossibility of getting beasts of burden. They were, consequently, obliged to travel with large caravans of porters, and their movements were much impeded, owing to the danger there was of the porters being driven away by hostile tribes.

BARON VON DECKEN replied, that camels would never do; there was such a quantity of mimosa and thorns that camels could never pass through them. There were very few roads, and these roads were alone practicable for camels. For his part he preferred to push his way through the bush. There were no mules in the country, nor were there any on the coast.

MR. CRAWFURD asked Baron von Decken if he had ever known the negroes to acquire the art of taming the elephant? The elephant would be fit for that country if only the negro had ingenuity enough to domesticate the elephant, as was done by people in other parts of the world, in which it was indigenous.

BARON VON DECKEN said he had never known an instance of the kind; MR. CRAWFURD remarking thereupon that he had expected such would prove to be the case.

The BISHOP OF NATAL asked whether the languages of the eight nations, which were said to have no connection, were similar to the languages of South Africa, in having the plural formed by prefixing a particle—a modification of the prefix which marks the singular?

BARON VON DECKEN said there was this connection: the people of the *Ugono* country were called *Wa-Ugono*; the people of the *Djagga* country were called *Wa-Djagga*. But there was no prefix to distinguish the plural from the singular.

The BISHOP OF NATAL asked, Would the plural of the name of the fly (*u-donderebo*) be *o-donderobo* or *aba-donderobo*?

BARON VON DECKEN said in the Mossi language it would be *wa-donderebo*; but in the different native languages it would be just the same as the singular. He was not able to say whether there was any relation between those languages and the languages of South Africa.

MR. TINNÉ asked if the Baron observed any rivers going westward or north-westward towards Victoria Nyanza?

BARON VON DECKEN replied he never had an opportunity of looking to the north; the range of the Kilima-njaro was too high for him to see in that direction. About thirty miles to the westward there was another range extending a considerable distance, which precluded the idea of any rivers flowing westward towards Lake Nyanza.

The second Paper read consisted of—

Two despatches from Dr. Baikie to Earl Russell, dated 25th July, 1862, regretting that ill health, from which, however, he had recovered, prevented his sending detailed accounts of several most interesting and, he believed, valuable journeys he had made in the kingdom of Kano, from the capital of which he wrote. He had prepared eight new vocabularies, and had visited about 30 different tribes. He had satisfactorily established the existence of the watershed between the Tchadda and the Quorra, and had carefully examined the little-known south-east portion of Kano due south of Lake Tchad. Some unimportant traces of Dr. Vogel and Serjeant Maguire had been discovered; and a private letter, also forwarded to the President, dated 4th August, stated his intention of returning to the coast. After giving a graphic account of life at Kano, "where," he writes, "I every day enjoy nothing less than bread-and-butter for breakfast, wheat rolls being daily hawked about or sold in the market, while fresh butter is a daily article: it is the nearest approach to home that I have had for a long time,"—Dr. Baikie spoke of the kingdom of Kano, to reach which had been his object for more than two years, as "the finest and best cultivated [country] I have seen." The rainy season of 1862 had been very light.

The PRESIDENT said Dr. Baikie was well worthy of their warmest encomiums. He had been a long time in the country, and they would now be anxious to hear that he had reached the ultimate point of his destination, and had there obtained the papers of Corporal M'Guire and some other papers of great importance to geographers.

3. *Letters from the late Dr. Vogel to his Mother and others.*

(A.) *Dated Aschenumma, Tiboo, 26th Nov. 1853.*

This letter describes the writer's painful journey of 15 days through sand from Mourzouk to the point where he then was, within 20 days' journey of Lake Tchad; after leaving which he hoped to reach Kuka by New Year's Day. The whole country he depicts as a sea of sand, with islets of palms, and bare black rocks protruding through the sand. On the 25th of November he had visited the Sultan of Tiboo, whose palace was a mud hovel, thatched with palm-leaves. Two goats and a horse assisted at the reception. The village is situate at the foot of a large steep rock, resembling the Königstein as seen from the Bastei near Dresden, which is undermined in every direction, and forms the refuge of the natives in case of attack.

(B.) *Kuka, 20th February, 1854.*

Arrived 15th January, after a long winter journey, in which several companions were prostrated by fever. The country is terribly barren in every direction for at least 4 or 5 days' journey, but may possibly be more cheerful after the rainy season. All the shrubs have strong spines. The soil is fit for cultivation to any extent, chiefly for indigo, cotton and melons, all which grow wild. Rice and wheat could be grown in great abundance (*vide* Dr. Baikie's letter, *ut supra*), but the former is so scarce that the king gives it away in presents. Wheat not grown at all. The slave-trade here consists chiefly in young children.

(c.) *Letter to J. K. Hinde, Esq., dated Kuka, 30th June, 1854.*

Mentions that his meteorological observations had been arrested by an attack of yellow fever, on recovering from which he accompanied what proved to be a slave-hunting expedition as far as 9° 30' N. (long. not stated), through unvisited country. Suffered great hardships, having lived for 20 days on boiled corn. Diarrhoea and small-pox ravaged the camp, carrying off 3500 out of 4000 slaves (almost exclusively women and children). Climate very unfavourable for astronomical observations.

After this paper had been read, Mr. Tinné, a relative of the Dutch ladies now travelling in Central Africa, stated that he had received letters from them dated 1st of July last, in which they announced that the whole party, having partly recovered from fever, intended to proceed towards a mountain they had heard of, called Casinka, of which there was no geographical knowledge. The country through which they had passed, south-west by west of Khartûm, was very picturesque, and the Nyam-Nyam country, to which they were bound, was said to be very fruitful. The ladies had left their boats at Lake Rek, near the head of the Bahr-el-Ghazal, and, the rainy season lasting until November, they did not expect to return to them before January or February.

The Meeting was then adjourned to the 23rd inst.

Second Meeting, November 23, 1863.

SIR RODERICK I. MURCHISON, K.C.B., in the Chair.

PRESENTATIONS.—*Charles J. Leaf, Esq.; Captain Marshall; J. W. Walton, Esq.; G. G. Engleheart, Esq.; H. J. E. Beavan, Esq.*

ELECTIONS.—*Edward Arber, A.K.C.; John Henry Barkhouse; William Best; Charles Albert Brophy; Lord Calthorpe; John Pincher Faunthorpe; George Fleming; John Townshend Fowler; David G. B. Gardyne; Lord John Hay, C.B.; Henry Hull; Captain Alexander Innes; Andrew Jardine; Robert Jardine; John Kirke; Edward C. Lowndes; Major-General James Matthie; Jerome John Mercier; Thomas Middleton; H. Byron Moore; Joseph Pattinson; George Herbert Pember; Henry W. Reeves; John Thornton Rogers; William Dukin Spear; Miles Staveley; William Tegg; Griffith Thomas; Archibald Travers; Hon. Edward Piennes Twisleton; Thomas Francis Wade, C.B.; Right Hon. Spencer Walpole, M.P.; Joseph Wilks.*

EXHIBITIONS.—Two Models—one of Gibraltar, the other Lines of Torres Vedras—by R. T. Wilde and Sons; presented through Admiral Collinson.

The first Paper read was—

"A communication from Mr. Tinné relative to the Dutch Ladies' Expedition from Khartum up the River Bahr-el-Ghazal," commencing 26th February, at a point on the White Nile.

DR. HEUGLIN, who accompanies the expedition, states (*vide* Petermann's 'Geographische Mittheilungen') that it left Khartum on the 24th January, 1863, with the intention of tracking the western affluents of the Nile, so as, if possible, to penetrate from this side into the country of the Nyam-Nyams.

A very favourable wind brought them on the third day to El-Eis, the most beautiful part of the White Nile. On the 31st January they passed Tefafan, 800 feet high, and 3 miles from the river, which is not, as hitherto supposed, of volcanic origin. On the 1st February the flotilla reached Hellat-Kaka, the residence of the Viceroy's deputy, a wretched nest of huts; and on the 4th passed the mouth of the Sobat. From this point for more than 200 miles the expedition had to work its way through the swamps of the Bahr-el-Ghazal, and on the 5th February reached Lake No; the goal of the expedition being the Lake Rek, or Mishra Rek. This part of the voyage was exceedingly tedious, the river resembling a narrow canal, full of curves and windings, walled in by impenetrable thickets of reeds or else mud-banks. Huge herds of elephants were passed, with hippopotami, buffalo, and other wild animals; but hunting is impossible, owing to the nature of the soil.

At length on the 10th March the entire flotilla reassembled. Here it became necessary to take the paddles off the steamer and proceed in small boats, one of which towed the steamer. In the last stages of the navigation of the Ghazal its banks were covered with

forests of ambadsh (*anemone mirabilis*), which fringes the banks in narrow strips, and grows in rather deep water. These forests Dr. Heuglin compares to rows of well-used brooms, very fragile, and from 20 to 25 feet high.

We now quote from the correspondence of the ladies.

“Mishra of Rek, 26th March.”

“I write at present from one of the most singular spots on the globe, which can only be reached by a route as singular. We pushed along up the Ghazal for three or four days, the river in front always appearing to have come to an end in a sea of herbage, alternating with bulrushes, &c. It proves, however, to be an immense marsh, through which the boats are slowly pushed, the brush-wood being beaten down with sticks, or cut with hatchets and scythes. After four days of this exhausting work we arrived at a small pond or lagoon, in which were crowded together, in the utmost confusion, twenty-five vessels of various descriptions. This was the Mishra or port of Rek. Here we had to stay to get porters, and only now can detail our plans. Dr. Heuglin has gone eight or ten days inland, to see whether he can find any, when we shall proceed to the spot selected for our passing the rainy season. The equipment of the expedition is something incredible, as we must carry with us ten months' provisions and stores—amongst other things, a ton and a half of beads, 8 bars of copper, 12,000 cowrie shells, pepper, salt, &c.; and as each porter only carries 40 lbs. load, you can form an idea of the immense number we shall require—above 200 porters at the very least. There is absolutely no traffic along the river, except for the *naggars* or merchandise boats in search of ivory; a pair of tusks fetching at Khartum perhaps 25*l*. These *naggars* convey provisions to the various stations or *zeribas*, as they are called, taking back ivory in exchange.

“May 13.—All is well now; we have 80 porters; we know whither we are bound; in short, all is right. Dr. Heuglin is quite pleased with the interior—pretty country, good water, and hospitable people, and is enchanted with the birds; quite rare and new, he says.

“We have had a visit from Mr. and Mrs. Petherick, who, hearing we were here at the Mishra, came to see us to offer to be of use to us, which they have been in many respects. They have had dreadful ill luck. They set off too late from Khartum in March, and the wind being adverse caused them much delay and damage, so they had to abandon their boats and proceed by land from Abukaka. This was the end of August, 1862; and it being the rainy season, that plan proved equally impracticable. They were delayed by

affrays with inhospitable natives and by illness, and only arrived at Gondokoro in February last, five days after Captain Speke, who, not knowing what had become of them, and believing them from the current reports to be drowned, accepted Mr. Baker's provisions, boat, and men, so that the Pethericks had to retain all they had sent forward for Captain Speke's requirements. These we have taken over from them,—beer, wine, tea, soup, pearl barley, Leman's biscuits, a gutta percha boat, and what not. It is strange to find these luxuries here, and we have enjoyed them famously.

"June 1.—We left our boats on the 17th May, and landed our baggage, in order that the porters might see what they had to carry. I cannot say that the first part of the country is pretty, but it is very peculiar; the trees beautiful, with a succession of neat villages, and pools of water. We arrived at a village called Afog on the 20th. Here my daughter fell ill with fever; and the next day our soldiers rebelled. They complained that they had nothing to eat, although they had five bullocks a-day; then they said they had not enough *doura* (grain of the country); but after some patient remonstrances, they all came, one by one, to beg pardon. So we arranged that as many as we could spare should go on to Ali-au-Mori's station.

[The illness alluded to, and also that of Dr. Heuglin, delayed the party for some days. We resume our extracts.]

"Once more *en route*, we shall, I trust, arrive safe and sound at the mountain, Casinka, where we are to remain till the weather is fine and the earth dry. It must be a beautiful country, plenty of game, and very good people, though no Europeans have been there. We have already sent off three companies of porters, about 400 men in all. They carry but little, say 40 lbs. each, and all on their heads.

"Afog, where we are staying, is a very pretty village, with rich cultivated patches, full of *doura*, besides a sort of ground-nuts and quantities of pumpkins. The trees are magnificent, and the cows, goats, and sheep abundant. The people live in beehive-looking huts, of which each family has three or four, for themselves and flocks. We have rivers to pass before we come to where we hope to stay, near the mountain Casinka. And we are now going to Ali-au-Mori's *zeriba*, where we have sent on all our provisions. From there we hope to cross to Casinka; and thence we are only two days from the Nyam-Nyam, our goal.

"July 1.—I know you will be glad to hear how, after all our trouble and expense, the new country pleases us, and that, though still weak and subject to attacks of fever, our invalids stand the journey very well: my daughter has a *ngerib*, arranged with a covering to keep

off the sun, and her mattress on it, so that she reposes very agreeably. We have 192 negroes for our immediate luggage; we have 38 donkeys, but they suffer so much from climate and neglect, and are so cruelly overburdened when we allow them to be loaded at all, that now they are kept for the sick or tired human beings. We take very short journeys, and always find a village to sleep in. The two first days, after leaving the Mishra, was not pretty; but there were some beautiful trees and so many rich villages, that it could not be called ugly; thousands of birds made it gay—such beautiful stations, belonging to rich negroes or merchants, such neat houses, surrounded by a high hedge of the poison-plant, and such a number of cows and sheep. After a while the trees became thicker and higher, and we were one whole day's journey in a wood of gardenias in full bloom, with jasmine and sensitive-plants. Afterwards the woods became forests of high majestic trees, and the ground covered with sweetest flowers; we had not time to pick many, as we are hurrying on. We crossed the river Djour on the 16th June, which took only six minutes for each party: but there were only seven boats for all our luggage and people.

"You can form no idea of the frequency and intensity of the storms—wind, hail, rain, thunder, and lightning—which makes us all the more anxious to reach our camping-ground for the rainy season. We had one on our landing from our boats at the Mishra; another just after our arrival at Afog, while we were pitching our tents; that of my daughter was blown down when half up, and herself nearly smothered in its folds. The severe cold and wetting she then experienced brought on a fever, which prostrated her for more than a week, and, as already mentioned, brought her almost to death's door. Our last experience was just after crossing the Djour, when, not having succeeded, owing to the stupidity of the vakeel, in bringing over our tents and baggage, the whole party were exposed throughout the night to the pelting of the storm, there being no village or shelter of any sort near. Fortunately the storm had no evil effect upon the health of any one of the party.

"I am writing this in the village where poor Dr. Steudner died. We did not meet a caravan, as we expected, and came on 21st June to a zeriba or village belonging to Buselli, a foreign merchant of Khartum, whose reception of us was magnificent, but who proved afterwards most extortionate. We are going to hire a small zeriba he has for 30 thalers, which we succeeded in getting, after he had attempted suddenly to charge 200 thalers. But it is impossible to tell how he teased us. First he turned out all our soldiers, and when we built a shed for them he asked hire for it! Then he has

once offered and refused negroes, and changes his terms every day; one day lets us have as much *doura* as we want, another refuses to let us have anything for our people to eat, and tries to make us pay 9 thalers for what costs at Khartum only one. The whole country is one field of *doura*, yet he will not permit his negroes to sell us any.

"The origin and system of these merchants are different here from the White Nile. A man comes into a village, sets himself down, and begins by buying ivory and making friends with the negroes, promises to protect them if they will take the ivory to the ships in the Mishra, and he either remains himself or leaves a vakeel. He builds a house or two, surrounds it with palisades, and, by degrees becoming master of the village, then proceeds to attack a neighbouring hostile village, and, having guns, of course they conquer. That village he attaches to the first, and so on till he has a good many villages, when he forces the negroes of the whole to furnish *doura* for his soldiers or fighting men, and they submit.

"We heard to-day from a party coming down from Casinka that it is no longer possible to reach the mountain before the rains; we shall, therefore, be shut up for the next four months, but it is very safe."

Writing before their departure from the Mishra on 6th May, finished 16th May, 1863, they had remarked:—

"There is no chance of our being able to come back here to rejoin our boats till December or January next. The rains do not finish till November, and then the rivers are so swollen, and the mud so deep, no animals can pass, nor are there any boats for us—nothing but a hollowed-out tree or a bundle of sticks joined together, which the blacks go about on: however, we shall make it out as well as we can.

"There is abundance of game everywhere. Of quadrupeds, we have seen giraffes and gazelles, and the recent tracks of elephants and buffaloes, large herds of which Dr. Heuglin fell in with on his previous short visit, when in search of porters, but they are now scared away by the noise of our large caravan. Of birds, there are francolin (rails), black partridges, and guinea fowls. Dr. Heuglin has collected specimens of 60 new and rare sorts of birds, which he has sent to the Museum of the University of Leyden."

The PRESIDENT, in conveying the thanks of the Society to Mr. Tinné for his interesting communication, repeated what he has often expressed—his admiration of these adventurous ladies, who had explored farther to the westward of the White Nile than probably any European. He then called upon

MR. TINNÉ, who added that it was a remarkable and adventurous expedition, organised and conducted entirely by two ladies. No doubt, in the course

of time, we should, through the assistance of Dr. Heuglin, acquire some most interesting scientific information. The country through which and into which they were travelling was one of great interest, and should they succeed in the object which he understood they had in view—which was to penetrate into the river districts of Central Africa, lying between the White Nile and the supposed mountainous districts of that part of Africa—the result would conduce to geographical knowledge. Without doubt, the large accession of water into the Nile was derived not only from the lake discovered by Captain Speke and Captain Grant, but also from other sources; and if these sources should be found in the regions visited by these ladies, the discovery would tend to elucidate the geography of Central Africa. In one of their letters they expressed surprise that no Englishman had spirit enough to go into that country.

At the request of the President, CAPTAIN GRANT next addressed the Meeting. He said that Captain Speke and himself at Khartum met one of the three ladies who had ascended the White Nile to Gondokoro on their first expedition, but had not joined that up the Bahr-el-Ghazal, where she was detained by illness and unable to accompany her sister and niece up the Bahr-el-Ghazal. They spent many hours daily in her society during the ten days they remained at Khartum, and Captain Speke wrote out instructions for her fellow-travellers then up the Bahr-el-Ghazal. They both strongly endeavoured to dissuade the ladies from penetrating into the country on account of the malaria which arose from the inundations, and which might prove disastrous to the expedition. He did not wish to prognosticate evil, but if anything could be done to prevent their exposing themselves to risk in that dangerous country, it would be desirable. He really hoped Mr. Tinné would recommend them to return, and so escape the fevers, and get out of the hands of those rascals the Turks, who would rob them of every sou, as the Meeting had just heard. He and Captain Speke came down the same latitude, and they met with nothing but immense wastes of tall reeds. There are no mountains in that latitude at all; only solitary hills covered with scrub, a few trees in the plains, and palms and acacias in the villages. Ascending the Nile up as far as the 5th degree north, there is nothing but eternal rush all the way. It was a most uninteresting and desolate country. The ladies traversed this region in going up to Gondokoro, and, of course, as soon as they saw a hill they were delighted with the country, and imagined that they must regain health and be restored to vigour. To Captain Speke and himself, coming from the rich and beautiful countries of the Equator, the region in question bore a most uninviting aspect. He must also point out the delusive nature of the idea which the ladies entertained, that they could get the Turks to carry loads.

[The President explained that the Turks spoken of were ivory traders, who had large establishments in the country, occupying several villages, and having the control of a great body of negroes. They appear to have received these ladies with a great show of hospitality, but the very next day tried to extort vast sums of money from them.]

CAPTAIN GRANT said the ladies had engaged 192 of these men as porters to carry loads of 40 lbs. each on their heads, and to go eight or ten miles daily. They had made one day's march, and already there had been a mutiny; and the ladies would find that, before they had gone ten marches into the interior, these fellows will have raised half-a-dozen mutinies. The men on that side of Egypt will not carry loads, but they will ride on donkeys and bullocks, and overload them shamefully. In Speke's expedition he engaged men from Zanzibar, a different caste of men altogether, and they carried 60 lbs. each man; but upon reaching the ivory traders' camps they were derided by these Turks, who sneered at them—"You are all women, to carry loads;" the consequence was, that the men were completely spoiled and ruined.

The EARL of DONOUGHMORE said he wished to draw attention to one point

which had been incidentally suggested by the Paper. It appeared that there is a very large drainage running into the White Nile from the Bahr-el-Ghazal. We had got some notion of the quantity of water which came down from the lake discovered by Captain Speke and Captain Grant. During the present season there had been a disastrous inundation of the Nile in Egypt, causing an immense loss of property and a considerable loss of life. Now, this inundation had arisen from natural causes which it was the duty of science to endeavour to discover; he therefore thought it would be very desirable that some steps should be taken by the scientific gentleman who was accompanying the ladies, upon his return, to compare the outflow of water from the Bahr-el-Ghazal with the outflow from the White Nile. That comparison would enable us to judge to a certain extent as to the amount of country drained by these two outfalls. We now knew where the White Nile came from, but we did not know the extent of the country whose waters drained into the Bahr-el-Ghazal. It might turn out that a considerable, possibly the larger, proportion of the water which formed the inundation of the Nile came from that quarter, and not from the White Nile. Therefore, a careful comparison of the quantity of water discharged by these two confluent rivers would be most valuable for the purposes of science.

The PRESIDENT said they were extremely indebted to Lord Donoughmore for this suggestion. He might observe that the ladies were really on the right road to obtain this knowledge; for their great object was to reach the mountainous region where the Bahr-el-Ghazal flowed. Should they succeed in reaching that region, which he was in hopes they would, notwithstanding the dissuases of Captain Speke and Grant—and should they discover that its waters are thrown off to the Nile on the one side, and to Lake Tchad and the other great lakes to the westward on the other, it would be a most important geographical result.

MR. TINNÉ stated that Dr. Heuglin corresponded with 'Petermann's Journal,' a recent number of which contains a series of valuable astronomical and scientific observations which Dr. Heuglin had transmitted to Germany. (This number unfortunately has not yet been forwarded to the Society.)

The PRESIDENT then read a letter from M. Du Chaillu, announcing his arrival at Acra, and stating that, having become a proficient in astronomical observation, he hoped soon to send most useful information, and thanked the Society for the assistance they had rendered him by supplying instruments, &c.

2. The next Paper, detailed in an abridged form, the observations of COLONEL PELLY on the geographical capabilities of the Persian Gulf as an area of trade.

COLONEL PELLY first describes the different suzerainties of the territories abutting on the Gulf, and briefly notices the various tribes that inhabit its shores—as the Chaab Arabs from the Karoon to the Hindcean; the territory directly held under the Shah, extending from Bushire to Lingah; territory leased by the Shah to the Imaum of Muscat, consisting of Bunder-Abbass and the coast northwards to Lingah, and southwards to a point not definitely specified by treaty, but tacitly recognised, as also the island of Kishm (on which is Hormuz) and its dependencies; territory of the Imaum

of Muscat, including Cape Ras Mussendom (south side of Straits), extending to El Khatif, and subject to independent maritime Arab chiefs, erstwhile pirates of the Gulf; territory of Nejd, from El Khatif to Koweit, professing allegiance to Turkey, but virtually independent; and, lastly, territory governed by Turkish pashas from Koweit to Busreh or Bussöra. It then describes the appearance of the country, consisting of vast green fields with herbage at all times suitable for sheep, and generally for cattle, till Bunder Dielum is reached in Persia Proper, near which are the remains of ancient cities of immense extent, where the plain merges in low sandstone and earthy hills. After passing another fine plain with ruins and the bed of an ancient stream whose waters are traditionally alleged to have been diverted by an earthquake, Bushire, the principal port of the Gulf, is reached, described as possessing by no means suitable accommodation for the trade that centres there, a large proportion of which is cotton.

From Bushire southward is a ridge of barren mountains, at the base of which nestle villages more or less wretched. Bunder-Abbass Colonel Pelly speaks of as being the best point for deep-sea vessels to stop at, so as to transfer cargo, either to go up the Gulf to Koweit and Bussora, or across by Yezd to a line extending from Herat on the east by Balfrush, Ispahan, and Teheran, to Tabreez, and so communicating direct with Central Asia. The port he describes as superior to that of Bushire, while Mussendom, on the opposite side, where the submarine telegraph from Bushire is to have its first station going eastward, has every facility on its western face for being made a coaling station.

The PRESIDENT observed that Colonel Pelly was brought up under the auspices of Sir Henry Rawlinson, from whom he hoped in the course of the evening to hear some remarks in connexion with the great telegraphic communication between England and India, which it was proposed to carry along this line of country. In the mean time he would ask for a few observations from Mr. Lynch, who was well acquainted with the Persian Gulf.

MR. LYNCH said the Paper gave an interesting and correct description of the northern part of the Persian Gulf. But Colonel Pelly was mistaken in supposing that Bunder-Abbass was the port of Shiraz. It was the port of Kerman, Yezd, and indirectly of Ispahan, but Bushire was the port of Shiraz and Ispahan. Bunder-Abbass was a very fine port, with at least 14 fathom water close in shore, and no doubt with the introduction of railways in Persia it would be of great importance. The physical features of the country were in its favour, for to the eastward there was a vast range of mountains; spurs of the Taurus, called the Elburz and Bukhtarian and Luristan ranges, extend along the eastern coast of the Gulf of Persia; whereas at Bunder-Abbass there was all open plain, which extended right up into the heart of Persia, first to Yezd, and thence to Ispahan. In former times Hormuz was the great emporium for this part of Persia. Its insular situation secured for it protection on the land side during the disturbed state of the country when it was governed

by the Tartars and Turks; and the Portuguese made it a grand depôt for the commodities of Europe, which when opportunity offered they sent into the interior in caravans, which traverse the country from Bussora to Damascus on one side, and to the capital of Timur on the other, and opposite Bunder-Abbass. When Persia becomes more enlightened and more amenable to civilisation, Bussora and Bagdad will, however, command the whole trade of this country. Merchandise will follow the water-line, and at Bussora and Bagdad it would find a much better access into the interior than from Bunder-Abbass, the country round which is remarkably desert and inhospitable, and its climate most prejudicial to European constitutions. From Bagdad to Ispahan was 20 days' journey by caravan, whereas from Bunder-Abbass it was nearer 30 days.

SIR HENRY RAWLINSON said it was only fair to Colonel Pelly to state that the Paper consisted merely of a few detached geographical facts culled from a very long and able Report on the general state of the Persian Gulf, which embraced political considerations mainly, together with statistics of trade and a variety of other matters.

Of Colonel Pelly himself he also wished to say a few words as a most deserving officer and a really good geographer. He is an infantry officer on the Bombay establishment, the same service which has produced Outram and a number of well-known historical characters. He graduated in Scinde, under Colonel Jacob and Sir Bartle Frere. He afterwards joined Sir Henry Rawlinson as Secretary of Legation at Teheran. After Sir Henry quitted Persia, Colonel Pelly travelled direct through Afghanistan from Teheran to India, being the only European travelling singly who has passed through since the time of the Afghan war. After that he went to Zanzibar, where he assisted Baron von Decken in his journeys into the interior. From Zanzibar he was removed to the Persian Gulf, where he is now political resident. Colonel Pelly had always appeared to him as a real type of the Indian officer of the old school—as hard as iron, plastic, ambitious, full of talent and energy, and ready for any work.

There were two points of interest in the Paper. The first was that the particular line of coast which Colonel Pelly had described was part of the great line of telegraph which is being laid down between England and India. From the mouth of the Euphrates the line will be laid submarine to Bushire; from Bushire it will follow down the coast the whole way to a point opposite Bunder-Abbass, where there will be a great telegraph-station; and from that point it will be continued along the coast of Mekran to Guadeh, and thence by land to Kurrachee. It was formerly proposed to bring the alternative line through Persia, down by land to Bunder-Abbass; but the Persian Government were obliged to give up the idea, because they could not protect it in the interior.* That alone would show what the country must be in the interior, and how hopeless it would be to expect to conduct a line of caravan communication into the interior from Bunder-Abbass. Bushire is the natural port of Shiraz; but if the interior could be pacified, no doubt Bunder-Abbass would be the proper line to Kerman and Yezd, and thence to Khorassan on the right, and Irak on the left.

The other point to which he wished to draw attention—and he was sure it would be interesting to Mr. Crawford—was with regard to cotton. He believed there was not a better cotton country in the whole world than all that region which Colonel Pelly had described lying to the north of the Persian Gulf. It had been very little brought before the English public. We had heard of Queensland, of the west coast of Africa, of Egypt, and the outlying regions of Turkey; but the country which he believed of all others was the most acces-

* This "alternative" line will, as at present designed, unite with the direct line at Bushire.—[Ed.]

sible, and the best qualified with regard to soil, climate, irrigation, and water-carriage, was this province at the head of the Persian Gulf, which had been almost overlooked.

MR. CRAWFORD asked what was the quality of the cotton.

SIR HENRY RAWLINSON replied, Sea-island-long staple. He might mention that a sample produced at Bussora had been compared with the best Sea-island by American merchants, and they did not distinguish any difference. The country available belonging to Turkey was 500 miles in length, extending down the valley of the Tigris and the Euphrates, every inch of which was perfectly open and adapted to cotton cultivation. It was a fine alluvial soil, and with the Tigris on one side, and the Euphrates on the other, the whole country could be reticulated with a series of canals from one end to the other. The same advantages would apply, though, perhaps, in a less degree, to the country to the east, which Colonel Pelly had been describing—to the country below the mountains, which constituted the ancient province of Susiana. In ancient times this province of Babylonia was the seat of great capitals, and Herodotus tells us that it paid one-third of the whole grain-revenue of the great empire of Cyrus, which extended from Egypt on the west, to Cashmere on the east. This was sufficient evidence of the natural capabilities of the country, and it was astonishing when we were looking everywhere for cotton fields that the great valley of the Tigris and Euphrates should have been so completely neglected.

MR. CRAWFORD said, notwithstanding we had been paying a bounty of 200 per cent. for cotton during the last two years and a half, Persia—which was so productive and so promising, according to Sir Henry Rawlinson—produced only 1500 bales out of the 2,000,000 that we required. Still, what Sir Henry had said as to the capabilities of the country was quite correct. If the country were well governed, and capital were introduced, the valley of the Tigris and Euphrates might be made, no doubt, one of the most productive plains in the whole world. Neither the valley of the Nile nor the valley of the Ganges excelled it in fertility. It could produce abundance of good cotton, but he doubted the advantage of growing Sea-island cotton. Sea-island cotton was fine in quality, but the quantity per acre was about one-half that of ordinary cotton. It would be far more profitable to produce good common cotton of the description that is chiefly consumed in this country.

With respect to the ports on that coast, he thought Kurrachee would become a great and important emporium. It commanded the trade and navigation of all the countries upon the great river Indus up to Lahore, just as Calcutta commanded the trade of the valley of the Ganges. Kurrachee was cutting off a considerable portion of the trade of Bombay.

This closed the discussion, and the Meeting was then adjourned to 14th December.

Library Regulations.

I. The Library will be open every day in the week (Sundays excepted) from *Eleven* in the morning to *Five* in the afternoon,* except on New-Year's Day, Good Friday to Easter Monday inclusive, and Christmas week; and it will be closed one month in the year, in order to be thoroughly cleaned, viz. from the first to the last day of September.

II. Every Fellow of the Society is entitled (*subject to the Rules*) to borrow as many as four volumes at one time.

Exceptions :—

1. Dictionaries, Encyclopædias, and other works of reference and cost, Minutæ Books, Manuscripts, Atlases, Books and Illustrations in loose sheets, Drawings, Prints, and unbound Numbers of Periodical Works, *unless with the special written order of the President.*
2. Maps or Charts, *unless by special sanction of the President and Council.*
3. New Works before the expiration of a month after reception.

III. The title of every Book, Pamphlet, Map, or Work of any kind lent, shall first be entered in the Library-register, with the borrower's signature, or accompanied by a separate note in his hand.

IV. No work of any kind can be retained longer than one month; but at the expiration of that period, or sooner, the same must be returned free of expense, and may then, upon *re-entry*, be again borrowed, provided that no application shall have been made in the mean time by any other Fellow.

V. In all cases a list of the Books, &c., or other property of the Society, in the possession of any Fellow, shall be sent in to the Secretary *on or before the 1st of July in each year.*

VI. In every case of loss or damage to any volume, or other property of the Society, the borrower shall make good the same.

VII. No stranger can be admitted to the Library except by the introduction of a Fellow, whose name, together with that of the Visitor, shall be inserted in a book kept for that purpose.

VIII. Fellows transgressing any of the above Regulations will be reported by the Secretary to the Council, who will take such steps as the case may require.

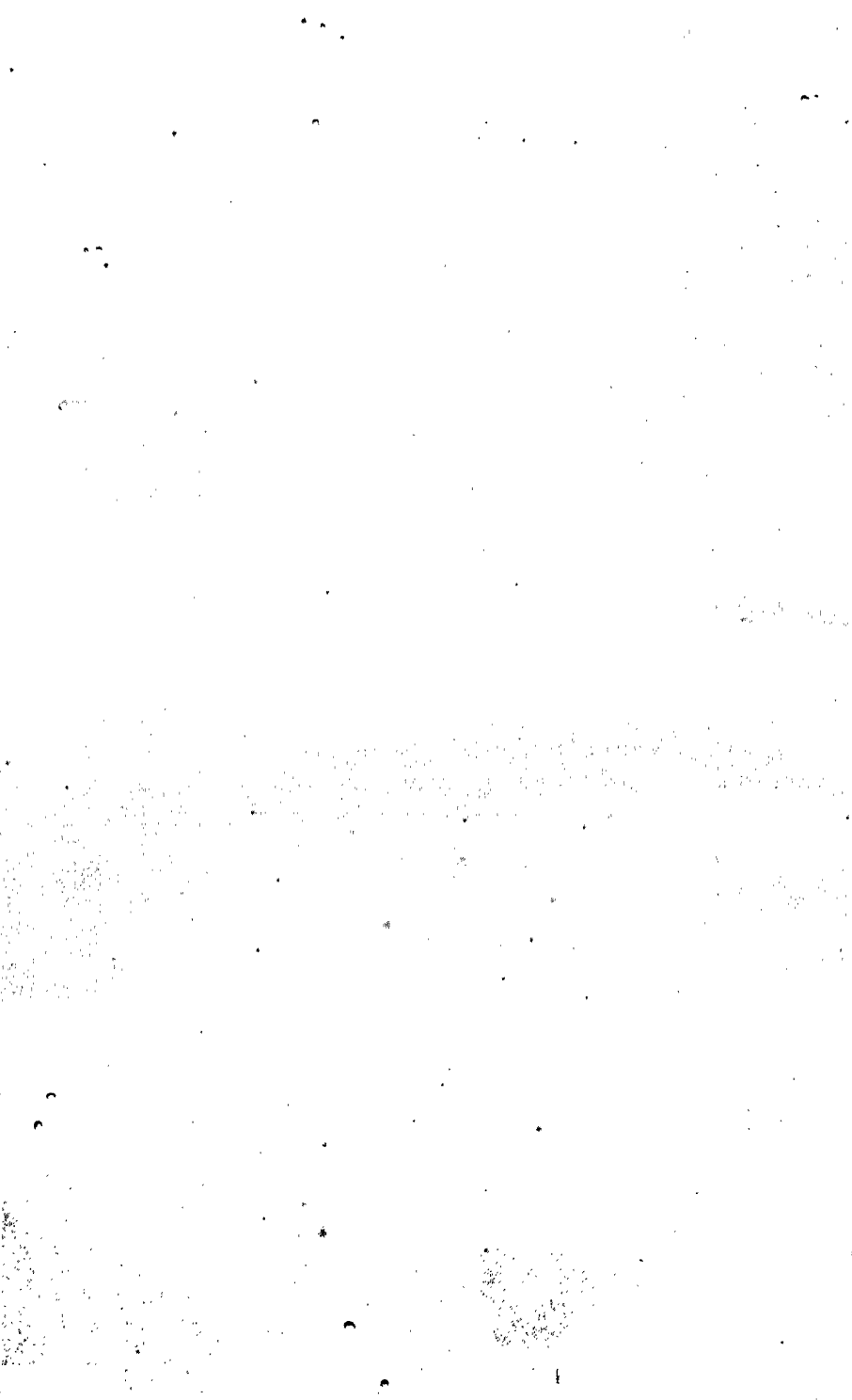
By Order of the Council.

* On Saturday the Library is closed at 3 P.M.

N.B.—Home and Foreign Literary and Scientific Societies whose publications are exchanged with those of the Royal Geographical Society, are requested to note the following abstract of the Regulations of the General Post Office with reference to matter sent by Book Post :—

Every packet must be sent either without a cover, or in a cover open at the ends, so as to admit of the enclosures being removed for examination. For the greater security, however, of the contents, the packet may be tied *across* with string, but must not be sealed, and should have the words "Book Post" marked in legible characters above the address, in all cases in which there is a postal arrangement for the transmission of printed matter between the two countries at reduced rates.

It is also particularly requested that all MSS. intended for publication in the Society's Transactions be written only on one side, for the convenience of printing.



PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED 25th FEB., 1864.]

SESSION 1863-64.

Third Meeting, 14th Dec., 1863.

LORD STRANGFORD, in the Chair.

ELECTIONS. — *Rev. John Bamforth; Thomas Bigg, Esq.; Donald Dalrymple, M.D.; Percy Matthew Hart, Esq.; Lord Gilbert Kennedy; M. Herman von Rönn; Charles Rowley, Esq.; Le Chevalier Giraldo dos Santos; James Duncan Thomson, Esq.; James F. Wingate, Esq.; John Randon Worcester, Esq.*

ACCESSIONS TO LIBRARY. — Among the Donations to the Library and Map-room since the 23rd November, 1863, were—‘Wanderings in West Africa by a F.R.G.S.’ ‘Captain Speke’s Discovery of the Source of the Nile.’ ‘Abeokuta and the Camaroons Mountain,’ by Capt. R. F. Burton, F.R.G.S. ‘Explorations in the Interior of the Labrador Peninsula,’ by Professor H. Y. Hind, M.A., F.R.G.S. Continuations of Transactions of various Societies, &c. &c.

ACCESSIONS TO MAP-ROOM. — Continuation of Ordnance Maps and Admiralty Charts. Government Map of Bolivia, by Colonel J. Ondarza.

The first Paper read was entitled—

1. *Notes on the Island of Formosa.* By ROBERT SWINHOE, F.R.G.S. &c., H.M.’s Vice-Consul at Tai-Wan-Foo, on the island itself.

The island of Formosa is a *foo* or district of the Chinese province of Fokien, and is governed by a special Taou-Tai, who may memorialise the throne direct. Mr. Swinhoe doubts whether, owing to its bad anchorage and bad harbourage, Tai-Wan-Foo can ever become a centre of British trade, especially as there are known to be other and far more suitable ports. After marching overland to Tai-Wan-Foo, which is described as girt by a high battlemented wall,

six miles in extent, the Paper mentioned that the town was fast going to decay owing to the silting up of the river. The difficulty of navigating the coast of Formosa is great, and there are numerous wrecks of vessels that are compelled to run for a port, and are ignorant of several excellent harbours unsurveyed near the south end of the island. On the north-west coast is the Tam-suy River, which Mr. Swinhoe seems to think destined to become the British port of trade, there being 16 feet of water at high tide over the bar. The capital, Foo Chow, is not far distant, and there are several natural landmarks for facilitating navigation. The chief danger is from the freshets in the early summer, when the mountain-snows melt. The river in its upper course is formed by two chief branches, near one of which are sulphur mines. Among other improvements effected by native skill is their having, about 40 years since, diverted a large stream of water so as to make amends for the very bad water on the plains. There is a wooden aqueduct, 5 feet deep, 8 feet broad, and about 360 feet in length, which has been rendered water-tight with Chinese cement. Not far distant from this the territory of the aboriginal savages inhabiting the east coast is reached, where the division line is strongly marked by the Chinese side being denuded of trees, for the cultivation of the tea-plant, while the native side is covered with the usual forest vegetation. Great quantities of rain fall from November to May, making the climate comparatively cold, as is evidenced by a table drawn up with considerable care. This excess of moisture the author attributes to an oceanic stream known as the Kurosino, which departs at the south cape of Formosa, and extends along its east side and past the eastern shore of Japan even to the Kurile islands, and is supposed to run for some distance alongside of a much warmer stream coming up from the Philippines. From the bold appearance of the eastern, northern, and north-western coast, the coast-line is assumed to be receding if anything. Excellent lignite coal is procured at Coal Harbour, on the north-east corner. There is fair sound tea on the island, besides rice, sugar, jute, grass-cloth fibre, rice paper, rattans, barley, wheat (superior to that of the mainland), camphor, petroleum, and dyewoods, and a constantly increasing import, chiefly opium.

The CHAIRMAN, in returning the thanks of the Society to the author of the Paper, said it was an exceedingly interesting and important contribution to our knowledge of a very curious and little known island. To nine-tenths of ordinary readers the name of Formosa would convey no more distinct idea than to recall the most successful typical forgery of modern times—George Psalmanazar's forgery of the Formosan language at the end of the last century. In reality it was a most beautiful and interesting island. The Paper touched upon the most important points connected with the island, and seemed to go with fair depth into them. There were three important points. The first was the geo-

-graphical position and relations of the island; the imperfect way in which it had been surveyed hitherto, and the very small knowledge which we possessed with reference to the coasts, and the way in which that had acted practically upon our commerce. The second point was the Chinese colonisation (which did not appear to be an official colonisation, but an encroachment of the Chinese upon the aborigines), the relations of that colony with the central government, and its commercial prospects. The third point was the aboriginal race itself. Fortunately each of these points could be illustrated by gentlemen present; by Sir Thomas Cochrane on the subject of the Chinese relations, and by Admiral Collinson, to whom we were indebted for the whole of our geographical knowledge of the coast at the present moment. He believed the Society would join him in echoing the opinion of Mr. Swinhoe, that the Hydrographic Office should take into immediate and serious consideration the unsurveyed state of the coast of Formosa, and especially the fact that when an appeal was made to the Admiral in command at Hongkong, he expressed his inability to grant assistance. He thought some suggestion might advantageously be brought to bear upon the Admiralty, for no doubt Mr. Swinhoe was perfectly right in saying that the present state of our knowledge on the subject was detrimental to British commerce.

Admiral COLLINSON said he looked upon Formosa in some measure as a child of his own. In the course of his survey of the Pescadores he occasionally caught glimpses of the far-off island, and availed himself of the opportunity to fix the position of the principal mountains, to the highest of which—above 10,000 feet high—he gave the name of Mount Morrison; a name which he believed all those who were acquainted with our original connection with the Chinese would acknowledge ought to be perpetuated throughout all ages. After his survey of the Pescadores, on his return to Hongkong, Sir Thomas Cochrane desired him to go up the east side of Formosa. It was a *terra incognita*. He went round in a little brig, which he commanded, and coasted along in search of a harbour; but no harbour could be found until he came to Blackrock Bay. Up to a certain point they saw Chinese boats; but above that point they did not see a single boat afloat. They came upon a beautiful and highly-cultivated terrace-ground of high hills, which rose almost immediately from the beach, and which were very confined and narrow. In Blackrock Bay, which was merely a basaltic protuberance from the coast, when he was making his observations, one of his assistant surveyors went on shore to take up a position to make a survey of the place. In the course of his walk along the beach, two of the natives came out and visited him; and those were the only two they got into communication with during the whole of their visit. They appeared to be more of the Malay than of the Chinese race. The Chinese whom they met with afterwards in the upper part of the island reported that they were cannibals, and lived in trees,—in short, gave them the worst possible character. He found that Mr. Swinhoe gave them a very different character; and he must say, so far as he could judge from the nice appearance of the houses and the cultivated lands, that he should have very much liked to have got into communication with them. With reference to the probability of our entering into commercial relations with the people on the east side, he was inclined to think that there was no opening for British commerce there. The coast-line was nearly straight; there were no indentations, and the boulders on the shore were so large, that they gave some idea of the immense force of the ocean-current which carried them there. The only place where they attempted to land afterwards was Chekodai Bay. There was a large river there, and they took boats and tried to get in, but found it impossible. They then went up to Sau-o Bay, and they found the Chinese had come round the end of the island, and were in full possession; but over the remaining portions of the island, the

Chinese had no rule whatever. Generally speaking, Formosa might be said to be half the size of Ireland; and from the papers that were given to him, he judged that the dialect was undoubtedly Malayan. The great equatorial current set in on the island in a more wonderful manner than it did in any part of the Atlantic. Off Steep Island, he was carried away one day 91 miles against the wind by the current, and on the following day 103 miles against the wind. The whole force of the motion of water given by the equatorial movement through the Pacific Ocean reached the island of Manilla; it then flowed up along the island of Formosa, and from thence on to the coast of Japan; but its greatest strength was felt at Formosa and Japan. He had no hesitation in saying that the current would be found to run at the rate of $4\frac{1}{2}$ to 5 miles an hour.

With respect to coal he might state, that finding no anchoring place but the little Sau-o Bay, they went round to Kelung Bay, and in pulling up the river they met with junks laden with coal. It was not known before that coal had been found in this part of the world. He was called to make an examination of it, and he went to the mines, which were about a mile and a quarter from the beach, and found them in a very primitive condition, worked simply by adits. They had no means of lifting, and the only seams which could be worked were those which could be worked from the surface. Whether a seam would be found by sinking was the province of the geologist rather than the nautical surveyor. He added that the island itself, at least the Chinese part of it, produced everything that was required in the shape of fruits and supplies, and that it might be called the granary of the Fokien provinces. The trade from Tai-Wan to Amoy and Loochoo Fu was very great indeed in rice, camphor, wood, and vegetables. The operations in the Gulf of Pecheli, and the opening of Japan to the commerce of the world, have interfered with the survey of Formosa, which was begun by him; but now that attention has been called to the island by the interesting paper by Mr. Swinhoe, it is to be hoped that some steps will be taken to complete the survey of its shores.

SIR HARRY PARKES said he was afraid he should scarcely be able to speak upon all the points suggested by the Chairman, for it was rather a complicated and little known subject. Mr. Swinhoe had rendered great service in directing attention to an island of immense extent, which was probably as much a *terra incognita* as any other unexplored part of the continent of Asia. It was less a *terra incognita* to Europeans some time ago than it was in the present day, for two centuries ago it was claimed as a European possession. The Dutch occupied it from 1622 to 1662. At that time, wishing to share with the Portuguese and the Spaniards in the trade of the East, they took possession of the Pescadores Islands as a check to Macao on one side, then held by the Portuguese, and on the other to the Philippine Islands, which belonged to the Spaniards. At the instance of the Chinese they relinquished the Pescadores Islands and established themselves on the island of Formosa, which up to that time had not been formally claimed by the Chinese, although separated from them by a channel only ninety-five miles in width. They themselves suggested that the Dutch should take possession of the island. At that time another power which had lately come into notice, the Japanese, were also located there; and whenever the Chinese and Japanese came in contact in those days, the Chinese went to the wall.

The Japanese followed a very different policy then from that which they pursued now. They were then the adventurers of the East, and they supplied mercenary troops to many Asiatic nations. They had flourishing colonies in the island of Formosa in the fifteenth and sixteenth centuries; and perhaps it was with the politic intention of setting one race against the other that the Chinese suggested to the Dutch to go there too. However, when the Dutch went there, they found not only the Japanese but also the Spaniards, and they

had to expel both before they became masters of the island. Masters of the island they scarcely continued to be: for, in consequence of the great civil troubles which set in throughout the whole of China in the middle of that century, swarms of Chinese flocked over into Formosa, against whom the Dutch were scarcely able to contend; until at last the famous piratical chief, Koxinga, who had been strong enough at one time to contend with the Tartars for the empire of the South, was driven from the country, and, crossing over to Formosa, he in turn expelled the Dutch from that island. Following the usual course of events, the pirate himself was eventually subjected to the Government; and, as late as 1682, the Chinese for the first time claimed jurisdiction over Formosa and incorporated it with their territories. It was now called a *Foo*, a territorial division of which there are no less than 260 in the whole of China. From that time Formosa ceased to be of much importance to the European; and even after our first treaty, though the coasts of China became accessible to us, yet notwithstanding the attractive name that it bears, Formosa was dreaded by us in consequence of the difficulties to which Admiral [?] and which rendered it a serious obstacle to the navigation of the coast of China. The South Cape was about the very worst point for a vessel to get on shore; for on that extreme point of the island there was a particular [?] numbering 200 or 300 individuals, who had an unfortunate past [?] and it was a habit with them to murder any foreigner that came in their way. He had occasion to make the acquaintance of these people about twelve years ago, when one of our vessels was lost on that point, and he was sent over by Her Majesty's Government to make some inquiries respecting the missing crew. They succeeded in rescuing two of the men, who were in the hands of another tribe on the western point, the wreck having taken place on the eastern point of the said Cape. These two men had been bought by the Chinese at 6 dollars a head, and had been in captivity with them six months. The north point of the island had also proved as dangerous to us as the South Cape. Two English vessels, the *Nerbuddah* and the *Ann*, were both wrecked there, in consequence of the strong oceanic currents which prevailed on the coast. That was in the year 1842; and although the crews of those two vessels did not fall into the hands of savages, but into the hands of the Chinese proper, they were treated in no better way; for, out of a crew of 240 on board the *Nerbuddah* 2 only remained with their lives, and out of 57 which formed the crew of the *Ann*, 10 only remained; the others having been taken to the capital of Formosa, and, after being kept in captivity there, murdered in cold blood. This was the character which Formosa bore to us: wrecks in the north and south, judicial murders on the part of the Chinese, and bloody murders made by the aboriginal tribes. We had now turned over a new page in the history of our communications with Formosa. The opening of the island to British commerce was one of the last acts which that great British nobleman (Lord Elgin), whose loss we had now to deplore, had accomplished by the treaty which he made with the Chinese.

As to Formosa being a colony, certainly in one sense it was a colony of China, though a very great portion of it still belonged to the aboriginal tribes; and it was worthy of notice that in this land were found impinging upon each other the remnants of very distinct races of men. To take the three little islands of Lambay Botel, Tobago, and Samasima, all situated in the vicinity of South Cape, the first was inhabited by the Chinese, the second by the Malay, and the last by Japanese. In other parts of the island it was difficult to say by what race it was possessed: some of the tribes were believed to be of Malay origin, and some of Polynesian; while still further north Mr. Swinhoe would say that the natives belonged to the aboriginal races of China. The island was very interesting in an ethnological point of view, because we had those distinct traces of different races of people; and, bearing this circumstance in mind, he

was not surprised that Admiral Collinson did not find in the pictures of the aborigines presented to the meeting any very strong resemblance to his friends in Blackrock Bay, certainly, those he saw were not so good-looking or so attractive as those represented in the pictures who probably came from the northern part of the island. At present the island presented two different aspects, the western and the eastern one: the western one prosperous and commercial, the eastern one wild and still occupied by savage races; where, as Admiral Collinson stated, no native craft were to be seen, while the narrow channel which separated the island from China on its western side was always crowded with junks. A further change, however, had taken place in later years; junks were passing out of date, and now most of the local trade was carried on in foreign bottoms. There was a large trade at Tam-Suy, and there was also a trade at Ta-kow. Lord Elgin's treaty in throwing Formosa open for trade did not specify for any particular port. He stipulated that Taiwan, which is the name for the whole island, should be thrown open to commerce, and it was afterwards for our consuls to find out which spot was the best suited for commerce. Mr. Swinhoe was perfectly right in considering Taiwan as unsuitable. He had visited that place himself, and he could confirm what Mr. Swinhoe said, that it is unapproachable to vessels drawing any depth of water; and the event had proved that Ta-kow in the south, and Tam-Suy in the north, were ports at which considerable commerce could be carried on. Although the Chinese might argue we were not entitled to more than one port, they had been so liberal as to allow trade at both these ports since the treaty came into operation. From the large immigration from China, he had no doubt that we should see the aboriginal tribes dwindle down, and perhaps at no distant date become altogether extinct; and it might be expected, that in proportion as they gradually disappeared, so commerce would increase. The foreign trade at present bore a local character, that is, cargoes were not sent direct from England to Formosa, nor from Formosa direct to England, but were exchanged between the island and the coast of China and Hong-Kong. The trade was already of sufficient importance to employ a considerable amount of foreign tonnage for steamers, and would probably speedily realize all the expectations formed of it.

The CHAIRMAN said that the only point he would advert to was with reference to the aboriginal tribes. The knowledge they possessed of these people as regarded their languages and dialects was entirely derived from the original Dutch settlers. Their occupation of the land was from 1620 to 1660. They were acquainted with two slightly differing dialects, and a discovery made twenty years ago had put us in possession of a Dutch grammar and a Dutch dictionary of another Formosan speech: this last derived entirely from all those that we had known of before. The languages of the island were the subject of a treatise in Klaproth's works. The whole of the languages had also been made the subject of a very able treatise by a distinguished German philologist, Dr. Gabelentz, who possessed a special knowledge of the Malayan and Polynesian dialects. He had compared those dialects together, and the result was that they possessed a general, but not a special, affinity with the Malayan or the Polynesian, rather than with the extreme type of the Oceanic race, which is usually considered of a different descent altogether. These Formosan dialects differed considerably between themselves, and amounted almost to two separate languages having general affinities. This was the only point to which he wished to call attention. He thought the physiological evidence ought to go hand in hand with the philological evidence, in order properly to determine the question of race.

.. The second Paper read was—

2. *A Journey from Nazareth to Bozrah of Moab.*

By F. A. EATON, Esq., M.A.

The Author commenced by stating that a fortunate rencontre with the Rev. Mr. Zeller, long resident in the country, induced the party of which the writer was a member, to abandon the beaten track from Jerusalem to Nazareth and Damascus, and, starting eastward from Nazareth, to explore the Hauran, a country east of the Jordan, as far as Bozrah of Moab. Such a tour, it was found, occupied but a fortnight, and is entirely safe as well as deeply interesting if accompanied by any one personally acquainted with the Arab Druse Sheiks.

Leaving Nazareth, the party first made for the encampment of Agleeby Agha. The road led along the north-east edge of the Plain of Esdraelon (Scriptural Jezreel), which it reached just beneath Mount Tabor. Leaving the plain and crossing the Wady Bireh, the Wady es Shirar is reached, in whose course were perceived what seemed to be ruins of reservoirs and aqueducts. In four hours after starting began to ascend hills to west of Jordan, on reaching the summit of which there lay extended below a view from Lake Tiberias to the Dead Sea. The old bridge by which the river was crossed is traditionally said to mark the spot at which Jacob and Esau met. At sunset of first day reached the Agha's encampment. Thence passed the Yarmâk (ancient Hieromax), and entered the Tetrarchical provinces of Peræa and Gaulonitis (? Scriptural Bashan and Gilead). Scenery very wild. Visited second day the hot springs of Amatha, 110° Fahr.; country generally of volcanic formation. In vicinity of springs are remains of a Roman bath. Reached Umkeis at 1 p.m., where the escort ceased. A Bedouin of the Beni Sukhr was here adopted as guide, and led the travellers due east along a crest of a range separating the Sheriât-el-Mandhûr from the Wady el Arab. Soil rocky, but thickly covered with stone-oak. Before entering the open plain beyond, passed numerous towers in the gorge. Put up with Sheikh Abdallah, of the Beni Sukhr, who was very hospitable, and occupied a region much resembling an English village-landscape. Made next day for Mezarib, a pilgrimage-station from Damascus, nearly due east, in order to get letters from the Governor of the Haurân, whose residence is here. The Wady Shelâleh, which was crossed the same day, and is described as flowing through a deep gorge, is the same as the Wady Warran, which forms the boundary north-west of the Djebel Ajlûn, and afterwards joining the Sheriât el Mandhûr. Course changed to due north; thence over a vast, level, treeless plain, covered with barley.

Reached the Haj (or pilgrimage-road) where it crosses the Wady-Dâre by an old stone bridge which marks the western boundary of Haurân proper. Country singularly flat. Mezarîb is a large, old, square fortress, with a few huts within its *enceinte*, and is only garrisoned during the Haj to protect the Damascus pilgrims on their road to and from Mekka. The visit taking place just at the period of the Haj, there were no fewer than 1000 infantry—perhaps more than were required; but in reality these concentrations of troops have a political object. Next point was Der'a, whence they hoped to reach Bozrah. Still the same flat plains, and passed a ruined village with stone roofs, indicating they had arrived in the Haurân. Next crossed the Wady Dâu, near which is an old Roman bridge of five arches, the shape of the buttresses evidently showing that the stream now and for ages past has run into the Sheriât el Mandhûr. Der'a is supposed to mark the site of the capital of the Kings of Bashan, though Mr. Porter prefers Edh'ra, as more easily fortifiable. At this point had to get a native Arab to act as guide. Next day passed numerous villages and reached Bozrah, whence there is a Roman road to Darû, which their road struck to the south. At this point they turned northwards by Dâmâ, a fort amid hills, whence they followed the ordinary often-described road to Damascus.

The CHAIRMAN said the part of the Paper which was of special interest related to the visit to El-Lejah. El-Lejah was a country which had been unrecorded, and to the best of his knowledge untravelled. He did not know how far Burckhardt went into the country; but El-Lejah was a mountain fastness said to be of curious geological formation, and he hoped Mr. Eaton would favour them with a word or two upon the subject.

Mr. EATON said the party with which he travelled had very little opportunity of visiting El-Lejah. Their visit was confined to a day, or a day and a half. It was very hurried, and afforded them no opportunity of studying the architecture of the villages and towns, or to mark even the inscriptions. The spot was very remarkable, being a sort of island-rock, in the midst of a level plain; it began as abruptly as the rocks on the sea-shore. They did not go into that part which had been described by Mr. Porter, and also by Mr. Cyril Graham, where there are very deep ravines; that part lay more to the north and west of El-Lejah; whereas the part which they visited was to the east, where the surface consisted of ledges and occasionally rough rock. The point they started from was midway between Ormân and Damascus; and at Dâmâ they were hospitably received by the Arab sheikh. The people supplied them with coffee, and refreshment of every kind; with water for their horses, which, considering they had to fetch every drop of the water from a distance of six miles on mules, was a great proof of the hospitality which they showed. There were about seventy or eighty people in all; and they had taken up their quarters there as a refuge from the Turkish Government. It was an admirable natural fortress; for there was only one entrance to it, which would be easily defended by ten or twelve resolute men. The towns in El-Lejah were certainly very numerous, and the remains very interesting. In the town of Dâmâ they saw a great deal of that peculiar architecture which was common to the country. There were some great stone doors, 10 or 12 feet high, which turned on their sockets with the greatest ease. They were of immense weight, and were hung on the *lambent* secret principle, great solid stones being used as

lintels at the top and bottom. With regard to their extreme antiquity, there was reason to doubt it; but the doors themselves, and the materials out of which they were made, might be of very great antiquity. He had also great reason to doubt the antiquity of many of the houses at present standing. They were all of the same kind, one as like another as possible. As the ruins around the place were of Roman origin, he thought that the doors were not of greater antiquity. The last purpose to which they had been applied was a mosque; and in the mosque you could trace signs of a Roman temple; and in the material itself you could trace signs of a still older building. At one spot there was a specimen of Cyclopean architecture, consisting of large rough stones, put together with mortar: that was the only specimen they saw which seemed to be ante-Roman.

The particular part which the Chairman had referred to as being untravell'd before was that which is arrived at immediately after crossing the Jordan. He understood that Lord Lindsay traversed the country near there, and he believed Dr. Beke had come across that route, but that the particular part where he and his party experienced the Arab Sheikh, had never been visited by Europeans before, at least no public mention of it. As to the identification of cities with names in the Old Testament, he was not prepared to say how far that could be established. No doubt there were many villages which might be identified rather by resemblance of names than anything else, and at best the identity must be more or less fanciful. The tribes were said to be most unruly and most lawless, and travellers had been deterred from crossing the country in consequence of the character which they possessed. The natives would try to get out of travellers all that they could by legal means, and if they failed in that they would endeavour to rob them; but to those acquainted with the language there was every facility afforded for going into that part of the country if they were so disposed.

MR. CYRIL GRAHAM said there was only one point which he wished to bring before the meeting,—that that portion of Mr. Eaton's track through El-Lejah which coincided with the old Roman road was new to Europeans. Burckhardt, Dr. Wetstein, and himself, had examined the ruins further to the west; the substructures, and in many cases the buildings, of which, although subsequently embellished by Roman chisels, are undoubtedly of more ancient workmanship. The probable fact that the houses and other structures along the line of the Roman road rose up in consequence of its existence, would sufficiently account for the remark made by Mr. Eaton with reference to the comparatively recent origin of the remains, which he saw. Had time permitted (Mr. Graham) should have wished to say much more on the subject of the Paper which had just been read to them; but, considering the lateness of the hour, he felt himself bound to conclude by calling the attention of the meeting once more to the chief point in Mr. Eaton's journey—the tracing of the Roman road.

The meeting was then adjourned to 11th Jan., 1864.

Fourth Meeting, Monday Evening, January 11, 1864.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*The Rev. William Byrnes; David Chambers, Esq.; John Conder, Esq.; Angus A. Croll, Esq.; John Ferguson, Esq.; Lieut. Francis Fitzpatrick; Mons. C. T. Fortuné; Capt. William John Foster; Charles Grierson, Esq.; Benjamin Hardwick, Esq.; John Harvey, Esq.; Robert Henderson, Esq.; William Gunston Howell, Esq.; Capt. George F. Lamert;*

Francis Richardson, Esq.; E. J. Routh, Esq.; Grenville Ryder, Esq.; Mutu Coomaroo Swamy; Richard B. Wade, Esq.

ACCESSIONS to LIBRARY.—‘Marvels of Friar Jordanus,’ by Colonel Henry Yule, C.B., F.R.G.S., presented by the Hakluyt Society. ‘Buddhism in Tibet,’ by Dr. Schlagintweit. ‘Results of a Scientific Mission to India and High Asia, undertaken between the years 1855-58,’ by Hermann, Adolphe, and Robert de Schlagintweit; Vol. iii. ‘Wanderings in West Africa,’ by a F.R.G.S. ‘A Treatise on the Chronology of Siriadic Monuments,’ by Hekekyan Bey, C.E. ‘Journal of the Discovery of the Source of the Nile,’ by Capt. J. H. Speke, F.R.G.S. ‘Abeokuta and the Camaroons Mountain,’ by Capt. R. F. Burton, F.R.G.S. ‘Continuations of Transactions of various Societies, &c. &c.’

ACCESSIONS to MAP-ROOM from DEC. 14th to DEC. 23rd.—South Polar Chart, by A. Petermann. Railway Map of proposed Metropolitan and Suburban lines (1864), by E. Stanford. Continuation of the Trigonometrical Survey of India, on 13 sheets. Part 3 of Schlagintweit’s Atlas.

The first Paper read was—

1. *On the Non-Auriferous Character of the Rocks of West Australia.* By E. C. HARGREAVES. From a Despatch of His Excellency SIR GEORGE BOWEN, Governor of Queensland, to His Grace the DUKE OF NEWCASTLE, and communicated by the Colonial Office.

MR. HARGREAVES, who first practically opened out the gold-mines of Australia, having been sent to examine West Australia, with the view of determining if, as had been loosely asserted, it would prove to be auriferous, has, after various excursions into the interior, reported, that although rich in iron and copper ores, its rocks, so different from those of New South Wales and Victoria, render it essentially a non-auriferous region. Relying upon the absence of those rocks, which Sir Roderick Murchison (to whom he refers) had cited as the only true *matrices* of gold in veinstones, he shows that the statement that that geologist had ever suggested that West Australia would be found to be a gold-producing country, was entirely unfounded. Mr. Hargreaves had sent home numerous specimens of the rocks.

The PRESIDENT, in expressing the customary vote of thanks to the author of the Paper, said Mr. Hargreaves was the first practical explorer of the gold-mines of Australia. He had been sent out by Government to see if Western Australia would prove auriferous. He had stated what was certainly a fact, that he (the President) never had the remotest idea of suggesting that Western Australia would prove auriferous; on the contrary, he knew very well from what had been previously said of the structure of these rocks, and from the fossils and

organic remains which had been brought before them by Mr. Frank Gregory, who had explored the country, that there were none of those ancient slaty rocks in the regions examined, with quartz veins in them, in which gold could be discovered. He had great pleasure in informing them that Mr. Selwyn, the geological surveyor of the rich auriferous colony of Victoria, was present; a gentleman who had contributed more to the real advancement of their knowledge as to what was probably to be contained in a gold colony than any other individual: and he, therefore, hoped that Mr. Selwyn would state what he knew of the probability or improbability of gold being found in Western Australia.

Mr. SELWYN said on his way up to Victoria he was at Albany for a few days, when he took the opportunity of seeing as much of the surrounding country as he could. He quite agreed with Mr. Hargreaves that there were no indications there of auriferous country, unless we took certain granitic rocks as being occasionally indicators of the presence of the ore. Hitherto it had not been generally supposed that granitic rocks alone were indications of auriferous country. The rocks about Albany were entirely granitic, overlaid by some of the middle and upper tertiary rocks, consisting of conglomerates, quartz grits, and conglomerates, and a white rock, which was referred to as chalky rock, consisting of silicate of alumina, and containing fossils in it. He never found fossils in these rocks, but he had found rocks, similar in position and structure, in Victoria, resting sometimes on granite, sometimes on Silurian, and sometimes on the upper palæozoic. All the specimens brought home by Mr. Hargreaves were entirely granitic and tertiary rocks, with a few specimens of hornblende rocks, which that gentleman spoke of as intersecting the granite. With regard to the auriferous character of these rocks, there was no doubt that these tertiary rocks, or the conglomerates of these tertiary rocks in Victoria, were the richest gold-bearing rocks; but they had been derived from the slaty Silurian rocks, whereas in Western Australia they had been derived almost entirely from the granitic rocks. Therefore he thought Mr. Hargreaves was right in his conclusion that in that district auriferous tracts were not likely to be found. Some of the specimens, in which Mr. Hargreaves found indications of copper, he thought were analogous to rocks of central South Australia, from Mount Serle to Mount Remarkable, in which the great copper-mines of South Australia occur. He thought, however, we ought hardly to take an examination of the coast-line as a proof that the whole of Western Australia was not auriferous, because if we looked at the enormous expanse of Western Australia, it would be seen that Mr. Hargreaves had traversed it but to a very limited extent; and it was not improbable that there might be regions in which the Silurian rocks might re-appear. If the coast-line of the province of Victoria, for example, were selected for examination, districts might be found fifty miles from the coast where there would be no auriferous deposits.

The PRESIDENT observed that other travellers had penetrated a considerable distance into the interior of Western Australia, and they had found little else but granite.

Mr. SELWYN added he had travelled over the whole of the settled districts of South Australia, from Cape Jervis to Mount Serle, and there were one or two districts where he thought it possible that the rocks were Silurian, and that gold might be found. But these rocks were only of limited extent: the great mass of the rocks were of a newer formation—Devonian, or something even newer than that. There was a large quantity of quartz, but the quartz did not appear to be auriferous. The characteristic of the South Australian rocks was copper, which was rarely found in the rocks in Victoria, associated with gold. Regarding the occurrence of gold in granite, he might mention that he had received information from one of his colleagues in Australia, stating that a new locality in Victoria had been discovered, at Wills Point, in which the quartz

reefs were turning out extraordinarily rich, far surpassing anything hitherto known. The Surveyor-General stated that the reefs were in granite and did not continue into the adjacent schistose rocks, and were horizontal. The discovery was made by eight miners, who in eighteen months had realized between forty and fifty thousand pounds each.

Mr. CRAWFORD asked if indications of tin had been found in Western Australia.

Mr. SELWYN replied, he had not seen any. Before he left, the Western Australian Government forwarded him some specimens of granite with mineral in it, which he found to be sulphide of molybdenum.

MAJOR SANFORD took exception to the conclusions of Mr. Hargreaves, and was about to enter into the question at some length, when the President begged him to postpone the discussion to a future occasion, in consideration of the importance attached to the next Paper which had to be read, "On the Glaciers of the Mustakh Range," and stated that an early opportunity would be afforded for considering the points mooted as to the capabilities of West Australia.

The second Paper read was—

2. *The Glaciers of the Mustakh Range (Trans-Indus)*. By Captain H. H. GODWIN-AUSTEN, Assistant on the Great Trigonometrical Survey of India.

STARTING from Iskardo 5th August, 1860, the survey of this region may be considered as divided into two grand divisions, separated by a line drawn through Iskardo, Shigar, and a point on the great range of the Kuen-Lun, about 40 miles west of the Mustakh Pass, leading into Little Bucharia. This Mustakh Pass is a newly-discovered pass, described as being capable of being so far improved as to be practicable for ponies, though the height is 18,400 feet. It is separated to the eastward from the renowned Kara-Korum Pass by the magnificent range running eastward from the Kara-Korum Peak, as yet unnamed, the second highest peak in the Himalayahs or the world, which rises about north-west to an elevation of 28,265 feet. Its approximate position is $35^{\circ} 53' \text{ N.}$, $76^{\circ} 35' \text{ E.}$,* that of Mustakh being $35^{\circ} 49' \text{ N.}$, $76^{\circ} 14' \text{ E.}$

The first portion of the survey lay up the Hushi Valley, a tributary of the Nubra, which name the author applies to the whole length of the North fork of the Indus (in lieu of its customary designation of Shah-Yok), instead of confining it as hitherto to the tributary branch of that name which falls in a little above the junction of the Hushi Valley. At the head of the valley he encountered three glaciers, the easternmost of which he traced into the recesses of the immense mass of the Masherbrum ($35^{\circ} 38' \text{ N.}$, $76^{\circ} 20' \text{ E.}$), 25,600 feet high. After surveying these in regular order, he

* The positions assigned in this abstract are only approximative as derived from the Map.—Ed.

returned to the junction of the Hushi with the Nubra, and thence westward 24 miles down the river to Kapaloo, $35^{\circ} 10' \text{ N.}$, $76^{\circ} 24' \text{ E.}$, which is itself about the same distance above Iskardo, whither he returned after twenty three days' arduous labour, and which was the head-quarters of the survey.

Captain Godwin-Austen next proceeded to determine a position for the triangulations to the south of Iskardo, the panorama from which, embracing nearly the whole extent of the peaks from Masherbrum westward, was magnificent.

That season being finished, it was necessary to postpone any further survey till 7th July, 1861, when a survey was made to the south-west of Iskardo as far as the Pass of Borijee. Thence he returned to head-quarters, and at once started for the village of Kuardo, having now completed the examination of the very remarkable basin of Iskardo, which bears evident traces of having been once an immense lake. Here the weather proved unpropitious, as it was throughout the season, but with occasional bursts of clear weather, when the views from the peak over Kuardo from south round to north-east—from the mountains bounding the table-land of Deosia over Kashmere round to the great Kara-Korum Peak—were grand beyond description. Shigar was finally reached 18th July.

On the 28th he proceeded to explore the Valley of the Bialdoh, which, rising in the distant glaciers of Punmah and the ridge bounding the great Baltoro glacier on the west, receives large numbers of glacial tributaries (the ice-cold water of which had frequently to be forded), and flows westward to a point where it receives the Basha, a similar glacier stream from the north, when the united streams flow in a s.s.e. direction, and take the name of the Shigar. Not long after setting foot in the valley, the party, while at camp, were nearly being swept away by the bursting of a glacier-lake, which rolled along huge blocks of rock and torrents of black mud,—a phenomenon which is called by the natives "Shwā," and is of by no means infrequent occurrence, corresponding, in fact, to what is known to Alpine travellers as a *débaule*.

After exploring the Pass beneath the peak of Mango Guror, Captain Godwin-Austen held eastward to the little hamlet of Askoleh, where the Bialdoh is crossed by a rope-bridge of 270 feet span, very safe, but very lax, and proportionately difficult. Thence over the glacier of Biafo, whence he held northward to the station known as Isok, $35^{\circ} 47' \text{ N.}$, $76^{\circ} 2' \text{ E.}$, the very centre of a ganglion of glaciers, streaming down from the west flank of the Masherbrum. In the very heart of this bleak region they encountered four Balti emigrants, returning

from Yarkand to pay a visit to their native vales, who gave a grim account of their sufferings crossing the Kuen-Lun.

Arrived at a point where four glaciers meet, he prosecuted his search up that to the north-west, known as Nobundi-Sobundi; returning from which, after a constant succession of ascents, including frequent bivouacs at great elevations, or on the ice, he reached the Mustakh Pass, which he ascended to within 500 feet of the top, when the weather compelled him to return. From this point he retraced his steps by the opposite side of the glaciers previously explored, to the junction of the Bialdoh with the Biafo, which is the outlet for the melted snow and ice contributed by the great glacier of Biafo, extending north-west 35 miles at a stretch to the ridge bounding the valley of Nagayr. There is also another glacier-feeder from the N.N.E., which was first examined; over which, immediately below the Masherbrum—which though unseen, owing to clouds, towered immediately overhead—lay the old Pass to Yarkand, discontinued on account of the great increase of late years of snow and ice, and the abandonment of which led to the Mustakh Pass being made use of. Examples of such changes within the memory of living men are quite common, and the Paper instanced two or three such.

Still penetrating into the heart of the glacier, the author began to look out for the great Kara-Korum Peak already mentioned, and not seeing it, began to fear that it lay beyond the watershed dividing the Upper Indus from Thibet. But a sudden turn, at one part of his route, revealed the giant peak towering in all its glory, an almost perfect cone, rising 14,000 feet above the point of view, and almost exactly on the line of demarcation. The weather now changed once more, and became so bad that it was impossible to push up the Biafo glacier as intended, and so pass over into Nagayr, whence he proposed to return by the pass of Nushik, $36^{\circ} 13'$ N., $75^{\circ} 13'$ E. Accordingly the party descended the Bialdoh, passing the Holy Rock of Shandseo Pir, over the village of Dasso, and so reached Tandoro on the Shigar.

From this point preparations were made for a short exploration of the other chief stream of these regions, the Basha. Leaving Tandoro 29th August, Chutrum was reached on the second day, whence the road (the travelling on which is excellent) lies up a singularly picturesque valley, that of the Basha, running first north, then west, as far as Arindoh ($35^{\circ} 52'$ N., $75^{\circ} 23'$ E.). At Doko, about halfway up the valley, a magnificent view was obtained over the great glacier feeding the river, and to the Haramosh Mountains, ($35^{\circ} 50'$ N., $74^{\circ} 57'$ E.) to the west. After a ten days' excursion on the glacier, on which their night's bivouac was made, the exploring

party passed up the Kerò Loombah (Loombah means ravine in Thibetan; La, a pass; and Ganse, a glacier), where were numerous traces of bears, though none were seen. Beyond this the Kerò glacier, which had now been reached, split into two; following up the main branch of which, two "kennels" for the use of travelers were passed, and the pass of Nushik came into view, an ice-bed gently sloping upwards between perpendicular cliffs to an elevation of 19,000 feet. This glacier extends unbroken down the other side as far as Hisper in Nagayr, $36^{\circ} 9' \text{ N.}$, $75^{\circ} 5' \text{ E.}$ This finished the north watershed of the Basha branch of the Shigar. Returning, ineffectual attempts were made to push to the westward, and ultimately the party returned to Arindoh, having completed an accurate survey of the whole Upper Shigar, the most striking features of which are the great glacier of Biafo, and the ever present proof that the glaciers are everywhere and rapidly encroaching on the soil fitted for agriculture; so that, in some places, land which formerly yielded two crops can now only bear one, owing to the altered temperature.

From Arindoh, the expedition now made for the Tormik, over the Ganto La (Pass), and reached Hürimül, whence the upper portion of the valley was surveyed, in which a hot spring (104° F.) was found. Captain Godwin-Austen now descended to the confluence of the Tormik with the Indus, which was crossed by the rope-bridge of Mendi, $35^{\circ} 35' \text{ N.}$, $75^{\circ} 15' \text{ E.}$, whence he proceeded up the river to Iskardo, passing on the way a terrific pass out along the face of a precipice overhanging the river, hundreds of feet below. At Shigar-Thang, $35^{\circ} 18' \text{ N.}$, $75^{\circ} 23' \text{ E.}$, the surveyor turned southwest to the Alumpi Pass, on which numerous skeletons were found, attesting the fate of a large party lost in the snow some years before. From this point, the season being broken and the survey ended, they pushed on into Cashmere.

The PRESIDENT, after expressing the thanks of the Society to Captain Godwin-Austen, said he was delighted that this communication should have come from the son of a man who had done more than any Englishman he knew to connect physical geography with ancient geological phenomena—Mr. Godwin-Austen; and as that gentleman was present, he congratulated him upon having a son to produce such a Paper. They were fortunate in having a gentleman present who had carefully explored these high regions,—that distinguished geologist and naturalist, Dr. Falconer, who was so long at the head of the Botanical Gardens of Calcutta. They would be delighted to hear from him a confirmation of the Paper. The great value of the Paper was that Captain Godwin-Austen, as one of the Trigonometrical Survey of India, had actually fixed the delimitation of these physical features in geography. The Paper might have been read before the Geological Society; and he would only call attention to one fact contained in it, that all the glaciers which the Alpine Club were in the habit of ascending were mere pigmies in comparison with these glaciers of the Himalayahs. The very

tributaries to these glaciers were eight or ten miles long, while the great glacier of Mustakh, to which their attention had been called, was thirty-six miles long in the part of it which was surveyed.

Dr. FALCONER, after describing the progress of the 'Trigonometrical' Survey in India, next drew attention to the glacier system of the Himalayas. All the best observers—Dr. Thomson, Jacquemont, and others—had been of opinion that there was but one great system of mountains. There was no such thing as any break of mountain range, or any distinct mountain-chains. There were great rivers which ran across, rivers like the Indus, the Sutlej, and some feeders of the Ganges; but, regarded in one grand aspect, they constituted a series or mass of mountains with ravines and valleys intervening. Viewed, then, in this light, there were two great ranges which culminated to especially great altitudes, and which bounded the Indus river to the south and the north; and this being one of the points where the Himalayan chain attained its greatest elevation, there the glacial phenomena were developed in most grandeur and upon the loftiest scale. The paper referred to that part of the range which bounded the valley of the Indus upon the north, the Kara-Korum or Mooz-tagh or the "Icy Range of mountains," and the other great series of them were the mountains which bounded the Indus upon the south. Although the glaciers upon the Shigar valley and in the valley of Bialdoh, which he himself had visited in 1838, were of such surpassing grandeur and importance, as had been mentioned by Sir Roderick Murchison, it was but fair to other observers to say that upon the northern side there were glaciers which, so far as description went, were equally grand, if not grander. Those to which he should especially refer were the glaciers at the head of the Zanscar river, the sublime features of which had been so well described by Dr. Thomson. Mr. J. Arrowsmith, from his labours on the maps of Hugel, Thomson, and other explorers, was well acquainted with the mountain range to which he referred and the glaciers which arose from it. There was the river called the Chenab, and a mountain-range which stretched across between the Indus and the Chenab. The pass of the dividing ridge at this point was 18,000 feet above the level of the sea; and upon either side, but more especially upon the north, at the heads of the Zanscar river, were some of the grandest glacier phenomena which were to be seen in any part of the world. There were glaciers extending from a very great distance, which attained enormous width—confluent into a sea of ice—and which, until the description that had been given by Captain Godwin-Austen, had been unrivalled by any glacial phenomena with which they were acquainted, except the glacial formations in the Arctic regions, such as the Humboldt glacier in Smith's Sound, described by Dr. Kane.

With regard to the glaciers upon the north, the Indus ran through a long depressed valley westward, receiving from the north three great branches; the first branch, called Shayúk, from the Kara-Korum, next the Nubra river, and also the Shigar, which was the especial object of Captain Godwin-Austen's communication. Now, the Shigar valley was the third of importance of all the affluents of the Indus, and was bounded by mountains of a great elevation. Some of them which had been measured by Major Montgomery attained a very great elevation; one a height of 28,000 feet above the level of the sea. This naturally entailed a prodigious amount of condensation of the moisture of the atmosphere, and led to a very heavy fall of snow, the result of which was seen in these glacial phenomena. Twenty-seven years ago he had been up to Arindoh, the extreme termination of the western or Basha branch, and from that point by a détour he got across upon the other valley by the Scora-là Pass to the glacier of the Bialdoh river, where he saw all the phenomena which had been described by Captain Godwin-Austen.

Having premised this much with regard to special details, there were one

or two points which he was desirous to bring before them. One was, What were the peculiar characteristics of the Himalayahs, as well as of all tropical mountains, as compared with our European mountain-chains? There was one characteristic of the Himalayan chain so remarkable that he should take the liberty of explaining it at some length. He presumed that most of his audience had visited either the northern or southern side of the Alps; and those who had been in the plains of Italy, along the valley of the Po, were well acquainted with the numerous lakes which jutted out from the Alps into the plain of Italy. Commencing on the west they had got the Lago d'Orta, the Lago Maggiore, the Lago Lugano, the Lago di Como, the Lago d'Isèo, and the Lago di Garda; in fact, wherever a great valley projected itself from the chain of the Alps at right angles to the strike of the chain, there they had with a single exception uniformly a great lake. But in these lakes in a general way, without reference to detailed description, he found one thing which was constant about them—"they were invariably narrow, and some forty or fifty miles long, as notably in the case of Maggiore, Como, and Garda." The next remarkable thing about them was that they invariably radiated out at right angles to the strike of the great chain of the Alps. The Alps made a curve from the Pennine round to the Rhoetian Alps. They would also observe that those lakes were severally fed by a considerable river which proceeded from a high ridge of the chain, and which was thrown forward into the plains of the valley of the Po.

If they would consider the Himalayahs, or any tropical range of mountains whatever, in a similar way, they would find that those lake-phenomena were invariably wanting. Great rivers like the Indus, the Chama, the Sutlej, and the Ganges, which passed through the Himalayan Mountains and debouched into the plains of India, had got valleys of infinitely greater importance than the valleys either to the north or south of the Alps; but they were never connected with a lake.

The question then arose, What was the physical reason of this great difference between the tropical mountains and those of temperate Europe? Nearly thirty years ago, he was for ten or twelve years rambling about the Himalayahs along a stretch of 800 miles, and he used to open a map before him, and try to make out the comparative features of European and Eastern mountains. He looked to the numerous lakes to the north and south of the Alps; and he would put the map of India alongside, where the same kind of rivers were debouching into the plains, but where there was an utter absence of lakes in connexion with them; and he used to puzzle himself in trying to discover a physical explanation of this difference. He was perfectly satisfied there must be some secondary conditions which were not common to the two, and he determined that, on his return to Europe, he should make them the subject of special research; for at that time the glacial investigations of Charpentier and Agazir in the Alps were unknown to a solitary wanderer in the Himalayahs. That intention he had carried out, by repeated visits to the Italian valleys of the Alps. There was the same kind of elevation above the level of the sea, the same kind of valleys, the same kind of fissures intersecting the great ridges,—What then was the explanation? This he would endeavour to indicate. About two years ago, as his friend Sir Roderick Murchison was aware, a Paper was brought before the Geological Society of London, by Professor Ramsay, which excited a great deal of attention, and gave rise to a very animated discussion. The theory of the Paper was that, as a rule, lakes in all the temperate and cold regions of the world were the product of glacial excavation; that is to say, that wherever a glacier descended from a high ridge of mountains into a plain, it ploughed its way down into the solid rocks and carved out a great lake. This was the theory or rather hypothesis which Professor Ramsay put forward, to explain the lakes which were so abundant in the

valleys of the Alps. A similar speculation, but greatly more restricted, had been advanced by Martillet a short time before. He limited the action of the glacier to scouring out the silt of the filled up lake-basins, the origin of which he attributed to antecedent fissures the result of upheavement. An application of this theory was made to the different physical phenomena which were connected with the case; and it occurred to himself and many others (and he believed Sir Roderick had an opinion in common with himself), that it was not adequate to explain the phenomena; and on the occasion when it was produced, he met it with the most lively opposition in connection with his own experience in the Himalayan Mountains. The opposition which he gave to it was upon these grounds. Many of them would remember that the lakes Maggiore and Como were upon the edge of the plains of Italy: that the glaciers—say that of the Ticino, which came down into the Lago Maggiore—descended along a steep incline, and were at last delivered into that lake, which was about 50 miles long, and only 8 or 9 miles wide at its widest point. Its prolongation nearest to the Mediterranean attained a depth of about 2600 feet below the level of the sea. Where the river escaped out of the lake it was not more than about 600 feet above the level of the sea. It was a remarkable point in the case that this glacier, by the hypothesis, should have ploughed its way down, and actually dived into the bowels of the earth 2000 feet below the level of the Mediterranean, and then should have again risen up along an incline at a rate of about 180 feet per mile.

Without going into all the objections, he might state he believed the principal one was, that the mechanical difficulties in the case were entirely left out of sight by the supporters of that theory; and on that occasion, after very long study of the subject, he endeavoured to bring forward what occurred to him as the true explanation of the difference between the Himalayan Mountains and the Alps. The difference he believed to consist in this: that after the last upheaval of the Alps, great fissures, or basins of lakes, were left there, with rivers running into them, in the manner in which the Rhone runs into the lake of Geneva, bringing down vast quantities of silt, which, if you give a sufficient number of ages, would have completely filled them up. But before this was accomplished, what is called the glacial period set in; that is to say, there was an enormous projection of ice and snow, below the limit that they now saw it in the Alps, out into the plains, both to the north and south of that chain; and, as the snow and ice came down, they filled up those lakes and formed a bridge, upon which the moraine material was carried over, there being a certain measure of incline from the summit of the Alps down to the plains of Italy. When once the basins were filled with ice to the depth of 2500 feet, they made, as it were, a slide or incline, upon which all the solid material could be transported; and that being carried forward by the *vis motrix* of the mass, formed the large moraine which we saw at Lake Maggiore, that of the Brianza, and also the moraine which bounded Lake Garda, where the battle of Solferino was fought. This was the secondary condition that occurred in Europe. Precisely the same primary conditions occurred in the great valleys of the Himalayahs, but without the same glacial phenomena. These mountains were thrown up above the level of the sea, and vast perpendicular fissures left, forming what constituted at that time the basins of lakes. But in those tropical regions the ice never descended from the highest summits down into the plains of India; and instead of being filled up by snow, which afterwards melted into water, these lake-basins were gradually silted up by enormous boulders and alluvium of every kind, which were transported down from the Himalayan Mountains in prodigious quantities by the torrential action of the periodical rains. The difference in the two cases was, that whereas the ice filled up the lake-basins in the Alps, constituting, as it were, the conservative means by which those lakes were saved from being silted up by

alluvial and other matters; in the Himalayan Mountains this conservative action did not take place, and the lake-basins remaining open got filled up in the manner which they had been told. If they would look at the map of the Himalayahs, one of the most remarkable things they would observe on the southern side of the chain, was, that there were no great lakes whatever—not one that would compare with Lake Lugano, or with any of the second or third rate lakes in the Alps. But if they crossed to the northern side of the chain, where the temperature was much colder during the winter, there they would find great lakes. The cold produced the same conservative action on the northern side of the Himalayahs, in preventing the lakes being filled up, which it did in the Alps by restricting the silting action.

This was the main fact to call to the attention of the Society, with reference to the great difference between the Himalayan and other tropical ranges of mountains and those in Europe. The next point was one of some interest and importance. There was a material well known in commerce and arts, called borax, now largely employed in ceramic products. It used only to be got from India as an export from Thibet, and it was invariably found in connection with hot springs. Within the last twenty years, a remarkable change had taken place. The late Count Lardarelle, an original-minded and eminently philanthropic Frenchman, of Leghorn, aware of the presence of boracic acid in the jets of steam which are emitted from the surface of the broken soil in the ravines of Monte Cerboli, on the margin of the Maremma of the Volterra in Tuscany, hit upon the happy idea of utilising the natural heat in lieu of fuel to effect the process of evaporation. Extemporized tanks fed by rills of cold water were employed to intercept the jets of steam until the fluid got charged with boracic acid; while other jets of steam, tapped from the soil, were led off in pipes and distributed under the evaporating-pans. An unbounded supply of boracic acid was the result. As a consequence, the borax of Thibet fell in value from 37 $\frac{1}{2}$ or 40 $\frac{1}{2}$ a ton to nearly half that price, until at length borax was exported from England at the rate of 10 $\frac{1}{2}$ per ton to displace the native article from the bazaars of India. In Thibet the mineral occurs in the form of biborate of soda, that alkali in many places abounding in the soil: while in Italy the base is yielded in the form of boracic acid. In both cases the appearance of the base was coincident with a region of hot springs, which occurred at great elevations in the Himalayahs, and for the best account of their connection with borax he could refer to Dr. Thomson's "Travels in Thibet."

Connected with the Himalayahs, there was also a physical and vital phenomenon of still greater importance. Henry Colebrook, the first who, along with Colonel Crawford, measured the heights of the Dwalagiri, procured from the plateau of Chanthan in the Himalayahs, at a height of 17,000 feet above the sea-level, fossil bones, which were brought down and exported as charms into India, to which the natives attributed a supernatural origin, and called them "lightning or thunder bones." At the present time, during eight months of the year, the climate differed in no important respect from that of the Arctic circle, and in the whole of the district there was not a single tree or shrub that grew larger than a little willow about nine inches high. The grasses which grew there were limited in number, and the fodder, in the shape of dicotyledonous plants, was equally scarce. Yet notwithstanding this scantiness of vegetation, large fossils were found, of the rhinoceros, the horse, the buffalo, the antelope, and of several carnivorous animals; the group of fossil fauna as a whole involving the condition that, at no very remote period of time, a plateau in the Himalayan Mountains, now at an elevation exceeding three miles above the level of the sea, where we got the climate of the Arctic regions, had then such a climate as enabled the rhinoceros and several sub-tropical forms to exist. It would occupy too much time to explain the details of this complex phenomenon. He would briefly state that the only rational

solution which science could suggest was that, within a comparatively modern period, a period closely trenching upon the time when man made his appearance upon the face of the earth, the Himalayahs had been thrown up by an increment closely approaching 8000 or 10,000 feet.

The PRESIDENT said he was sure that every person present had been delighted with the philosophical observations which had fallen from Dr. Falconer; and it would be very gratifying to him if so great a traveller and so eminent a naturalist would become a Fellow of the Royal Geographical Society.

Mr. GODWIN-AUSTEN, having been called upon by the President, said, since the Paper was written, his son had visited other districts. The survey was now being carried on from the Kara-Korum Pass into Thibet, and the work of last year had been carried round the Pangong lake. The district was the most remarkable of any that he had yet seen in the great Himalayan range. It was out of the British dominions; and the survey was being carried out by the Government of India solely in the interests of geographical science. This particular work was undertaken in consequence of the reports of travellers that there were to be found in this district some of the largest glaciers in the world. In the Report to the Indian Government* it was stated that the survey was undertaken simply to verify that point, and it had turned out to be the case. He did not know whether all persons present had any conception of the enormous dimensions of this Himalayan glacier system. It would enable them to form some idea of the magnitude of these glaciers if he stated that, assuming Hampstead and Highgate to be high mountains, the glaciers would extend as far south as Tunbridge in one direction, and two-thirds of the way to Cambridge in the other. Or, if they were to start from Neufchâtel, they might cross the Oberland and Monte Rosa, down to Ivrea, and even then they would be within the limits of this glacier system of the Himalayahs.

The meeting was then adjourned to 25th January.

Fifth Meeting, January 25, 1864.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Lieut. A. G. Clark (late I. N.); Hugh Thurburn; and John Conder, Esqs.*

ELECTIONS.—*Lord Richard Cavendish; F. A. Eaton; George Green; John Kempster; Simon Keir; Edward Mackeson; Rev. J. W. Tottenham; Hugh Thurburn.*

ACCESSIONS TO LIBRARY.—‘Explorations in the Interior of the Labrador Peninsula,’ by Professor H. Y. Hind, F.R.G.S. Continuation of Transactions (various), &c.

ACCESSIONS TO THE MAP-ROOM since 23rd December, 1863.—Philip’s Atlas, Part 18—the Consulting Index. Railway Map of London, by E. Stanford. Two Geological Maps of Grossherzogthum Hessen-Darmstadt. Continuation of the Admiralty Charts and Ordnance Maps.

* By Major-General Sir A. S. Waugh, at that time (1860) the Surveyor-General of India.

. . EXHIBITIONS.—Sketches taken on the Moisie River, Labrador, by Professor H. Y. Hind. Profile section of the bed of the Moisie. Selection of Indian Pipes, to illustrate the ethnographic and philological analogies of the various main races of the Red Man, and their respective subdivisions.

The PRESIDENT then announced the names of the gentlemen who had that day been selected by the Council for election as Honorary Corresponding Fellows, with a brief abstract of the distinguished services to the cause of geographical science which had induced the Council of the Society to nominate them.

NAMES of distinguished Foreigners who have been added by the Council to the list of HONORARY CORRESPONDING MEMBERS of the ROYAL GEOGRAPHICAL SOCIETY.

Barth, Dr. Heinrich (Berlin), Gold Medallist of the Royal Geographical Society, author of many publications on African geography. President of the Berlin Geographical Society. Now engaged in the issue of an elaborate treatise on the languages of Northern Africa.

Dufour, General (Berne), Director of the Topographical Department of Switzerland. The faithful maps of that country, issued under his supervision, have earned the grateful acknowledgments of English travellers of widely different vocations.

Khanikoff, M. (Russia). Eminent as an Asiatic traveller and geographer; author of a well-known work on Bokhara.

Linant, Pasha (Alexandria). The earliest explorer of the White Nile, and otherwise distinguished as an Egyptian geographer.

Petermann, Dr. Augustus (Gotha). Originator and editor of the well-known 'Mittheilungen,' in which capacity he has contributed, more than any other person in Germany, to disseminate a wide knowledge of sound geography.

Raimondy, Don Antonio (Lima). Author of a work on the Amazonian provinces of Peru. Now engaged in exploring the unknown parts of that Republic.

Scherzer, Dr. Karl, Ritter von (Vienna). Editor of the 'Voyage of the *Novara*.' Eminent as an American geographer and ethnologist.

Berbrugger, M. M. (Algiers). Author of 'Algérie historique et monumentale;' editor of the 'Revue Africaine,' Algiers.

Dana, Professor J. D. (New Haven, Connecticut). Distinguished as a physical geographer and naturalist. Author of various Memoirs, including Essays on the Origin of the Great Features of the Earth.

Duveyrier, Henri (Paris). Known by his extensive travels in the Sahara, notices of which have appeared from time to time in the 'Transactions of the French Geographical Society.'

Faidherbe, le Colonel, Governor of the *Senegal* (West Africa). Eminent for his successful encouragement of geographical enterprise in the French Colony of the *Senegal*.

Figanière, Command. Jorgé César (Foreign Office, Lisbon). Distinguished for his researches into the ancient geographical records of the Portuguese empire.

Forchhammer, Professor (Kiel). Professor in the University of Kiel. Author of *Memoirs on Scandinavian Geography* and on Greece, and on the Troad.

Leal, José da Silva Mendes (Minister of the Colonies, Lisbon). A statesman interested and actively engaged in the development of the Portuguese possessions in Africa.

Scheda, Herr von (Vienna). Director of the Imperial Institute of Military Geography.

Tschudi, Herr von (Vienna). Traveller, naturalist, and writer on Peru. Author of a well-known work on Switzerland.

Decken, Baron Carl von der (Hanover). Explorer of Kilima-Njaro, in E. Africa; to which region he is preparing a new expedition, at great cost, and wholly at his own expense.

Fremont, General (New York). Explorer in the Rocky Mountains, and Gold Medallist of the Royal Geographical Society.

The PRESIDENT then said that, before proceeding to the business of the evening, he felt it his duty to say a word or two upon the most distressing intelligence which had appeared in some of the papers regarding the fate of his very eminent, dear, and distinguished friend, Dr. Livingstone. If he had felt persuaded that Dr. Livingstone had lost his life, he should have been incapacitated by his deep affection for him, from alluding to the subject at all. He had good hopes that he had only been wounded, and that the Makololo who accompanied him had alone perished. In the 'South African Advertiser' there was a letter from Dr. Livingstone in reference to his recall. Being still anxious, like a good geographer, to do something more before he left the country, he determined to visit Lake Nyassa, and terminate his discoveries with respect to the sources of the great Shiré river, upon which he had so long been employed. He started, it appeared, without any of his own countrymen, taking with him only five of the Makololo nation, people whom he knew to be particularly attached to himself, and on whom he could depend. He alluded to this in the letter which he wrote to a friend at the Cape:—"I take Makololo with me, the only reliable fellows in the country;" and, he adds, "If we could have stopped the enormous slave-trade of Lake Nyassa, I would gladly have spent all the money I ever received." These were the sentiments that this noble fellow expressed when about to start upon this expedition. With regard to the catastrophe itself, he gathered from a letter from Simon's Bay that the *Ariel* had brought intelligence that Dr. Livingstone had received some injury in the foot when landing on the shores of Lake Nyassa. He hoped this was really the extent of the disaster; for, though the Makololo, who were strangers and hated by the natives of that region, might have been slain, Livingstone, who was beloved by all, was probably spared.

The first Paper read was—

Narrative of an Exploring Expedition into the Interior of Western Australia, Eastward of the District of York, Commanded by HENRY MAXWELL LEFROY, Esq. (Superintendent of Convicts), from May to July, 1863.

THE object of the expedition was to discover new districts suitable for sheep-farming, the outmost station at present being Smith's, about three days' journey only east of York. It was found that primeval granite was the chief formation for full 6° east of York, occasionally fissured but nowhere upheaved, except towards the western face of Darling Range. This is covered in certain spots by sedimentary rocks, nowhere more than 100 feet in thickness. The general effect of the scenery consequent upon the (meridional) faulture mentioned above, is imposing, but their agricultural fertility is slight. From the Avon eastward to the limit of the drainage basin (118° 30' E.) the country is flat, with abundance of wide shallow valleys. Leaving Smith's Station the country improves, the grass being good, with a sprinkling of trees resembling the mimosa, and a species of dwarf pine. Animal life is so scarce, that in 155 miles the party only saw four kangaroos, three emus, and no natives; though they one day came upon a recent track of a solitary individual. On the numerous lakes passed, there were noticed only four ducks, and neither cockatoos, turkeys, nor parrots. As they proceeded inland they came upon a chain of lakes bordered by samphire plains, at present 10 feet above the level of the stream, but probably less in the rainy season. Beyond this a rise of 5 feet in the lake waters would probably inundate a tract five miles wide. A careful examination led to the conclusion that there had been no overflow for many years, possibly for centuries, and that for several winters the average depth of the water had not reached 2 feet. Some fine cypresses were visible here. If grazed closely by sheep, the young grass would be of the most nutritious quality, the depth of the rich alluvial soil being 15 feet, as evidenced by numerous natural surface-drains. Little or no wind was experienced throughout.

THE PRESIDENT said the Paper had been curtailed with reference to the geological phenomena of the region in question; which, as a geologist, he almost regretted. The idea of the author seemed to be, that there was a mass of granite here, the nucleus, as it were, of the original formation of the globe, which had remained undisturbed for many ages. It was a phenomenon which ought to be discussed in the Geological Society. The Paper was one of merit, written by a gentleman who had passed a period of twenty years in the colony, and who had no doubt made accurate observations upon the country. He had also brought forward clear proofs that there were in this

region large tracts of valuable alluvial land, which might be cultivated with great profit to the colony.

General LEFROY said, when his brother told us, with the experience of a settler of more than twenty years in West Australia, that the region he had been the first to explore contained an extent of valuable agricultural and sheep-farming country unequalled in the colony, it opened up some good news to those who were well-disposed towards that unfortunate colony. His brother dwelt very strongly upon this point, particularly upon the extraordinary richness of the granite in those felspars which were the elements of fertility, wherever they were found. There was also great interest in the view which he announced as to the possibility of our having in this portion of the Australian continent access to the primeval nucleus of our planet, the primeval granite over which there has never been any great depth of sedimentary deposit, which has never been disturbed by fissures or disrupted by intrusive rocks, and which is nearly in the condition in which our globe would have been originally if it had been a granite sphere cooling gradually. Mr. Lefroy was deeply impressed with the evidence presented in the rocks of the extreme antiquity of this region. We find in the vegetation and in the living representatives of the most ancient vegetation of the globe. It is the same with a portion of its animal kingdom, and also with its representatives of the human race. For example, the only native Australians met with by the expedition was one female and her child, both in a state of absolute nudity. The extraordinary sparseness of the human race, and the very peculiar conditions under which they exist there, point to a degree of primitive simplicity and antiquity which he thought would be found of considerable interest hereafter. Houseless through three-quarters of the year, perfectly naked in all weathers, and distributed over the country at a rate probably not exceeding one family to forty or fifty square miles, it is difficult to conceive of human beings in a deeper state of degradation. "Man," says Mr. Lefroy, in one of his letters, "is here only another species of the mammalian fauna who has the singular property of being both carnivorous and graminivorous, and is as unconscious of traditions, laws, moral principles, and social institutions as the scanty kangaroos or emus who share the country with him." The language of this female was unintelligible to the native from York who accompanied the party. No kindness could overcome her terror, or induce her to accept what they offered her. Having no personal acquaintance with Western Australia, General Lefroy could not venture to say how far his brother's anticipations of a beneficial change in the vegetation of those great plains, to be brought about by cattle-feeding, would be realized; but it would appear that a moderate expenditure of labour would remove the curse of aridity by saving the abundant water which is sent by heaven, but, in the singular conformation of the surface, finds no valleys to drain it off, no basins to collect it, and no depth of soil into which it can subside. It seems to evaporate with the minimum of benefit to the earth. The expedition had suffered much, both from the want of this necessary and from the multiplicity of what they could collect. On one occasion they were 36 hours without it; but, notwithstanding this, he was glad to say they lost only two or three horses, and returned themselves all the better for their hardships.

The next two Papers related to New Zealand, and were therefore read consecutively. They were respectively entitled—

(a.) *Expedition to the West Coast of Middle Island, New Zealand (Otago Province).* By JAMES HECTOR, M.D., &c., and

(b.) *Survey of the Lake Districts of the Province of Otago.* By JAMES M'KERROW, Esq., District Surveyor.

DR. HECTOR's party were absent from January to March, during which period, after proceeding up the valley of the Waitaki and thence into that of the Ahuriri, they traversed the magnificent plains across which lies the boundary-line between Otago and Canterbury, and gained the river Clutha. This they followed up to the Wanuka Lake, whence they had to push forward on lightly-packed horses. They now followed the Matuki-tuki River, where the headquarters were fixed for farther exploration westwards. As they advanced they began to see the ice-pinnacles of Mount Aspiring, a beautiful and very abrupt cone, which dominates over the other lofty ranges of the region. Hereabouts a noble forest of beech covered the hillsides to a height of 2000 feet, the scenery being magnificent, with noble cascades leaping several hundred feet down the sheer face of the precipice (in one instance 1200 feet), the water being dispersed in spray ere it reaches the valley below. Farther on, amid a profusion of white-blossomed willow-trees, the river enters a deep gorge, on emerging from which a fine view is obtained of the glaciers that descend from the flanks of Mount Aspiring. At this point it was found impossible to take the horses further, which were therefore left at a secure point, while the party advanced on foot—a most arduous march over huge boulders, especially as each man had to carry a light pack of 50 lbs., afterwards reduced to 25 lbs. At length, after leaving the wooded belt, which here reaches an elevation of 3500 feet, they gained the source of the Matuki-tuki, in two enormous old glaciers. At this point, close to the north-west boundary-line of Canterbury Province, they ascended a saddle-hill, 5500 feet high, overlooking a grand glacier in the valley below, 500 feet thick, and named after Dr. Haast, while immense masses of pinnaced mountains filled the valley below. The descent on the farther side was so precipitous as to be exceedingly dangerous, and after crossing the foot of Haast's glacier they struck a river named after the same eminent geologist, which passes through numerous gloomy gorges. Here they climbed another peak (elevation not stated), whence they had a view of the sea, 15 miles distant. To the left of the landscape was the glacier of Mount Richards, in which the Jackson rises. They now attempted to push on, and in doing so discovered track-marks, at first supposed to be made by Maories, but which Dr. Hector, on minute examination, pronounced to be those of birds, either extinct or exceedingly rare (possibly Moas). These never entered the woods, the magnificence of which in this region must be seen to be appreciated, even the *fuchsia* and *tutu*

growing into trees with trunks 2 feet in diameter. An ineffectual attempt was now made to descend the Jackson; but the rain proved an insurmountable hindrance, and they had to stop within eight miles of the sea. In returning they suffered severely from famine, but ultimately reached their various *caches* without mishap.

[The foregoing is the latest intelligence received; but Dr. Hector has gone round in a schooner to the west coast, whence he is said to have sailed up a stream into a large lake, within easy distance of Lake Wakatipi. But no report of this has yet reached England.*]

(b.) This was a survey of 4883 square miles in the province of Otago; the general result of which was to establish, as the most striking physical feature of the country, the very sudden differences of elevation which diversify its surface, the gorges or valleys being generally filled by lakes. The mountains range from 4000 to 9000 feet, the line of perpetual congelation being 8000 feet. The ranges usually run from N.N.E. to S.S.W. directly across the track of the prevailing winds in the Pacific, and hence they materially affect the climatology of the island by acting as condensers of the vapour-laden atmospheric currents, which but for their interposition might pass over the island without parting with their moisture. The snow-line was higher on the north-west, or windy side of the mountain, than on the other side; hence the floodmarks of the rivers show rises and falls of almost incredible amount; some of those running into the Te-Anau and Manipori Lakes (which drain a region of hundreds of square miles, and are themselves of immense area), showing a difference of level between winter and summer of as much as 9 feet. Such basins serve in great measure to regulate the otherwise overwhelming impetuosity of the streams, by confining them within a regular channel, instead of presenting a mere useless wide shingle-bed to the very edge of the sea. These lakes show geological traces of their having been at a remote period of much greater extent than they are now. At present they are supposed to be hundreds of feet in depth; their sides, like those of the sea-floors at the lower end of the north-west side having frequently no beaches of any sort, the rocks rising sheer out of the water to several hundred feet in height. Of the country surveyed, 1636 square miles was pastoral country in detached sections, 959 was forest, chiefly beech, pine, and *totaru*, and 1960 barren mountain—the remaining 328 square miles being lake or river.

The PRESIDENT said this was the first time the physical geography of the southern portion of New Zealand had been opened out to us. The task had been performed in an admirable manner in both communications, and the results of

* Just as the present number of Proceedings is passing through the press, a narrative of the Expedition has come to hand.

the exploration were certainly very striking, considering the enormous difficulties these two gentlemen had to encounter. Dr. Hector was the well-known naturalist, geologist, and geographer who accompanied Captain Palliser in his expedition to the Rocky Mountains, and he was very well entitled to be recommended as the Chief of the expedition. Among other striking features alluded to, Dr. Hector spoke of the *gullies*, which he described as paths that only could have been followed by great birds, of which a skeleton was to be seen at the British Museum, and of which we had recently had reports that some of the species were still living. He had also alluded to the glaciers of the country. Dr. Hector described a great mass of erratic blocks and large moraines that had been brought down by glaciers of still greater extent than those now existing there. In fact, the whole of the western coast of New Zealand was a highly Alpine region. The President further stated that he had received from Dr. Haast, the Provincial Geologist of Canterbury, in New Zealand, a most valuable memoir, describing a map of that province and illustrated by numerous exquisite pictorial sketches of mountains and glaciers, which would be read at the next Meeting.

Mr. HARPER asked to be allowed to point out a route which he took in 1857, undertaken merely from a desire to explore this hitherto unknown part of the island and for his own purposes as a geologist. Accompanied by a few natives, he passed across New Zealand, up the Hurunui River to the lakes in the mountains, and thence down the river Teramakau on the other side to the west coast and Jackson Bay. On that occasion he had an opportunity of observing the geography of the country. There is a great dividing range, extending almost right through the centre of the island, from north-east to the south-west, about 100 miles from the west coast at the part where he crossed them, but gradually trending to the westward—so that in the Otago province the watershed line would be hardly more than 30 miles from the coast-line—and terminating in the cliffs surrounding Milford Haven and the fiords to the south. He ascended the watershed and stood upon the saddle of the range, with high snowy mountains and glaciers on both sides of him; and from that point he saw the Hurunui running to the eastward, and the *Teramakau* river, the *Teramakau*, running to the westward. By following the *Teramakau* down from its source, as he had followed the Hurunui up to its source, he avoided the difficulties of cliffs and forests which Dr. Hector met with. It took him twenty-six days to get down to the west coast. During that time he was unprovided with necessary food, having only started with sufficient for a month, which they had to carry on their backs, and much of it got spoiled from the difficulty there was in crossing and recrossing the river, which they had to do by fording and swimming, and with their provisions on their backs, the dense impenetrable forests on both sides obliging them to keep as much as possible to the bed of the river. They were utterly destitute before they got to the coast, and had to live on native birds, which he brought down with his gun. On getting down towards the coast the river was too deep to ford, and they had to make a raft. The stream was very rapid, and in the course of a few hours they found themselves in the breakers on the beach. He met with very few natives on the coast. He went down the coast with one old man and explored: it is nothing but a long sandy beach, with a dense forest reaching up to the Snowy Mountains, every 20 miles or so broken by large rivers with bar harbours, mostly impracticable for navigation. These rivers rise, as do all the rivers of any size in the Middle Island, in the Snowy Mountains, fed by glaciers, &c., and having corresponding rivers rising in the same part of the mountains, and flowing down to the coast. Cook stands out a grand sight about 30 miles from the coast, and the whole of the intervening country is covered with dense primeval forest. From Jackson Bay he endeavoured to strike inland, but having no provisions he was compelled to return to the point where

he struck the coast, and recross the island by his former route. The expedition took about three months.

LORD DONOUGHMORE asked if on the western coast there was any harbour or roadstead likely to give protection to shipping, because these forests then might be rendered extremely valuable.

MR. HARPER replied, there was no harbour worth speaking of until you came down to Milford Haven, in the south-west corner of the island, and all round there the coast was indented with fiords. But where the Mawhera or Grey River entered the sea small steamers had lately crossed the bar, and a settlement was being formed there, the Government of Canterbury having spent a great deal of money in opening up a road along the route which he took. A harbour on the west coast would have been a great boon, because it would have placed Canterbury in direct communication with Australia.

THE PRESIDENT asked if the fiords on the west of Otago Province were deep.

MR. HARPER said they were very fine harbours, but so deep that it was difficult to find anchorage.

3. The fourth and concluding Paper was—

An Exploration up the Moisie River to the edge of the Table-Land of the Labrador Peninsula. By HENRY YULE HIND, M.A., F.R.G.S., &c., Trinity College, Toronto.

THIS river had been for centuries the canoe-route of the Montagnais Indians, from the Gulf of St. Lawrence to the interior, and latterly has been similarly used by the Nasquapee Indians, whose hunting-grounds are on the table-land. Its mouth is 18 miles east of Bay of Seven Islands, and its course is almost due north. The north-east branch is separated by a very low water-parting from the headwaters of the Ashwanipi, or Hamilton River, the chief stream of the table-land, 1400 miles in length, by which it is possible to navigate its course to this point, and so complete the system of canal navigation through the interior. The numerous portage-paths, by their condition, indicate the antiquity of this route. The distinguishing features of the Moisie portion of which are the constant succession of rapids, falls, and impetuous currents; alternating with lakes of widely different levels, into which occasionally may be seen half-frozen streams descending from the barren hill-tops, which in winter become masses of ice, that fall with inconceivable violence into the valley below. Where the stream becomes too rapid for the canoes to stem it there are portages, one of which occurs so low down as 45 miles from its mouth. Where the north-east and north-west branches unite (both being of about equal volume), the channel is about 150 yards wide in June. The canoe-route lies for 25 miles up the Coldwater, a small affluent rising in Trout Lake, which, singular to say, throws off two considerable streams flowing in opposite directions. In this 25 miles the river falls fully 1500 feet. Beyond this lake occurs a comparatively level lake-track, strewn with innumerable boulders,

richly clothed with mosses and lichens, and sometimes 20 feet in diameter. Reaching the ledge of the table-land, the elevation was discovered to be about 1850 feet, the highest mountain visible being 2200. The course of the Ashwanipi, which forms the connecting link in the internal system of navigation, is roughly parallel to the gulf. Further on, a range of snow-capped mountains, two days' journey (about 60 miles) distant, was discernible in the north-east; while north and north-west was a bare undulating country, devastated by the numerous conflagrations that have swept over the country, and has greatly diminished the animals of the country, on the chase of which the Indians depended; in consequence of which the Montagnais Indians have been reduced to a handful, leading a miserable existence on the table-land.

The PRESIDENT, after thanking Professor Hind for his valuable communication, asked him to explain the use of the pipes in the form of the pipes used by the different tribes of North American Indians near the course of the Moisie River, and also to mention some instances of lakes having two outlets; observing that correspondents of the 'Athenæum' had questioned the truth of Captain Speke's statement with reference to Lake Nyanza having two outlets.

Professor HIND said he would mention some instances that had come under his own observation of the existence of two outlets in lakes. The first was at Trout Lake, which occupied the summit of a subordinate mountain-range at an altitude of 1460 feet. It sent out in a north-east direction a tributary to the Moisie River, and in another direction the Coldwater River. He passed into Trout Lake by the Coldwater River, and out of it by the Moisie River tributary. The next was Lake Winnipeg, which also has two outlets, one flowing into Lake Winnipeg, and the other into Lake Superior. The natives are in the habit of passing from the Winnipeg watershed to that of Lake Superior by means of the Prairie-Portage Lake and its outlets, without taking their canoes out of the water. Then, from a lake and marsh in the Q'Appelle River valley there is a small river which flows into the elbow of the south branch of the Saskatchewan in a westerly direction, while from the same lake issues the Q'Appelle River, which, after a course of 276 miles, reaches the Assiniboine River in an easterly direction. The fourth instance consists of a series of lakes, three in number, known as the Backfat Lakes; they have a communication with the Souris River on the one hand, and with the Pembina River, an affluent of Red River, on the other. These were four instances of two outlets from lakes, through three of which he had himself passed, and the fourth he had seen from the summit of a mountain. Professor Hind then called attention to varieties of stone pipes on the table of different forms, and pointed out the peculiarity of each specimen as probably distinctive of the Indian nation by which it had been adopted. A certain type of pipe is used by the Crees, whose hunting-grounds lie to the north of those belonging to the Ojibways. The Crees have a type of pipe peculiar to themselves, and the form of those used by the Plain Crees at the foot of the Rocky Mountains is almost identical with the pipe of the Nasquapees, a tribe of the great Cree nation, on the table-land of the Labrador peninsula. The Ojibways, whose hunting-grounds lie to the south of the country inhabited by the Crees, have also a very distinct and well-marked form of stone pipe, which enables any one conversant with the customs of Indians to recognise it as characteristic of the Ojibway people. It was suggested that if this peculiarity in the form of

the stone pipes in use by different Indian nations in their natural state should be found to be constant, it might form a valuable mean in the hands of the archaeologist of arriving at some clue respecting the "Mound builders" of the valleys of the Mississippi, the St. Lawrence, and elsewhere.

Colonel LEROY stated that, in the Rocky Mountains, there existed another lake, called the Punchbowl, from which the water flowed in one direction into the Pacific and in the other into the Arctic basin.

Captain SPEKE, with reference to Lake Nyanza, said he had only seen one outlet, but he had been informed there were four outlets, and he had no reason to doubt the accuracy of the statement.

The meeting was then adjourned to Monday, the 8th of February.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Extracts from Private Letters received from M. DU CHAILLU.*

THE following extracts from letters recently received from M. du Chaillu by Fellows of the Society, who have kindly placed them at the disposal of the Council for publication, explain the position and prospect of that enthusiastic traveller at latest accounts, and may be considered supplementary to the letter read by the President at the Society's Meeting of 11th January (v. Proceedings, Vol. viii. No. 1, p. 18).

"Fernand Vaz River, 18th October, 1863.

"I have arrived, as you will see by the heading of my letter, at the intended field of my explorations. I have met with a great misfortune, the boat containing my baggage being much upset, and most of them have been spoilt. I was on board myself, but thanks to a kind Providence my life was spared.

"I send to Gaboon a little box containing a gold watch, a pocket chronometer, and a small sextant, to be forwarded to your care, and should be exceedingly obliged if you would forward them to the care of the Royal Geographical Society."*

* * * * *

"Fernand Vaz, 19th October, 1863.

"I shall stay near the sea-shore until the end of the rainy season, say the beginning of May, so that I shall have time to receive a further supply of scientific instruments before proceeding into the interior. Just now I am building a large bamboo house, which is to be my abode till I leave the coast. Housebuilding is not very expensive; my new abode, which will be a palace as compared with my present wretched hut, will only cost me some 25%.

"Everything looks well in regard to my future explorations. The way is clear before me. I have been very heartily received by the natives, who said they never expected to see me again, as I had been so long of returning to them. I have thus far enjoyed pretty good health; but one attack of fever, which I got over in a few days. As soon as my house is finished, I intend to begin taking photographs, as these will add greatly to the interest of any new geographical facts I may obtain for my next work. At present, living as I do in a dark native hut, I do not care to unpack my chemicals.

"The weather is beginning to become very hot."

* The box with enclosures was received, and repairs made good.

2. *Resources of the Niger as regards legitimate Trade.*

(Extract from a Letter from Commodore WILMOT, H.M.S. *Rattlesnake*, to the Commander-in-Chief of the Cape Station, dated 9th December, 1863.)

"Lieutenant Gambier ascended in the steamer as far as Egga, about 360 miles from the entrance of the river. From thence he advanced a further distance of 5 miles in his boats, and entered a small river, up which he went 50 miles to a village called Wunagi, 7 miles from Beda, the capital of King Massaba. Dr. Baikie accompanied him.

"At Wunagi they were met by King Massaba's messengers, who informed them that horses would be sent down for their conveyance to his town.

"The name of the river is not given in any chart, neither has it been surveyed. It will be well to call it by some name connected with this year's expedition. It is about 300 yards across in the broadest part, and from 30 to 40 in its narrowest part. Depth unknown; but Lieutenant Gambier thinks it to average quite 2 fathoms.

"The banks are thick with mangrove, and a few trees; but the country is well cultivated, yielding Indian corn and yam. There is also the 'butter-tree,' which is about 10 feet high. There is also 'shea butter,' which is used by the natives for food and for medicinal purposes. There is plenty of cotton, red and white, and large quantities of it are grown. At every village cotton was brought down for sale.

"The country seems well populated with much of the same description of people as in other parts of Africa. All were very friendly, and anxious for trade.

"The soil appears to be most fertile; cotton, Indian and Guinea corn, cassava, date-palm, yams, &c., growing in great abundance. The yams are superior to those of most places on the coast; and the climate from all accounts is very healthy, a fresh breeze blowing up from the sea.

"There are partridges and guinea-fowl, also elephants and buffaloes, in the neighbourhood.

"Dr. Baikie came on board at Lukoja, his own place about 220 miles up; and was greatly rejoiced to see the *Investigator*, as his supplies were exhausted, and he had given up all hopes of being relieved this year.

"The missionaries were all landed at those places where they had missions, embarking again when the *Investigator* returned.

"From the entrance of the Niger to Egga, a distance of 360 miles, the average depth in the rainy season is between 4 and 5 fathoms, excepting in one part of the ship-channel, which has only 10 feet. This, of course, makes it impossible for vessels drawing more water to proceed further than this shallow part, which is about 200 miles up.

"There is another passage on the other side of the island, near which this 10-feet channel is, which has not yet been surveyed; and Lieutenant Gambier thinks it highly probable that a deep channel may be found there.

"My opinion, formed upon the information I have been able to obtain, is that it would well repay one Company to take the trade of the Niger into its own hands, encouraged and assisted by a yearly subsidy from the Government, until the trade is regularly and permanently established, and certain profits arise.

"After this it would be, of course, for Her Majesty's Government to rescind the charter and do away with the monopoly, as they think proper.

"It appears that this single 10-feet channel mentioned above, is the only obstacle, excepting the river-bar, to vessels of large draught of water navigating the river, after passing the bar, and taking in their cargoes 300 miles up.

"This is a very serious obstacle, but can be overcome by steamers of light draught towing up large cargo boats, or hulks of a considerable size. The bar is another drawback to vessels drawing much water. There is only 12 feet on it in the rainy season.

"A Company must therefore be prepared to enter upon their work with two powerful paddle-wheel steamers drawing when loaded 9 feet of water, which is only one foot less than the depth of the channel in its shallowest part, with a good supply of cargo-boats or other conveyances, as they may deem expedient for river-work.

"The ship to receive the cargo must be at anchor outside the bar. These steamers should be armed with one heavy and one light gun, also a proportion of small-arms, rockets, &c., in case of necessity. They should be very fast, well ventilated, and carry at least 100 tons of coal. A depôt of coal must be in the river at the best selected place, and wood can be obtained very cheap. I should say that steamers with two rudders would be the best, which will prevent the necessity of turning.

"At first some little difficulty will doubtless arise, which must be expected; but the enterprise of the British, backed up by the energy and skill of British seamen, will conquer every obstacle, and establish a trade in the Niger that will fully satisfy, in a few years, every one that is really interested in the happiness and prosperity of this part of Africa."

NOTICE.

The Library of the Royal Geographical Society will on and after 1st March, 1860, open at 10:30 A.M., and close at 4:30 P.M. on ordinary days, and at 2:30 P.M. on Saturdays.

PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY..

[ISSUED 28TH APRIL, 1864.]

SESSION 1863-64.

Sixth Meeting, 8th February, 1864.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Revs. G. P. Badger and J. J. Mercier, John Kempster and G. Clowes, Esqrs.*

ELECTIONS.—*Rev. G. P. Badger; J. Cockfield Dimsdale, Esq.; Sir Frederick Halliday, K.C.B.; Gavin Hardie; Charles Savile Roundell; Edmund Trimmer; and Henry Weguelin, Esqrs.*

ACCESSIONS TO LIBRARY.—‘The Cotton Trade; its bearing upon the Prosperity of Great Britain and Commerce of the American Republics, considered in connection with the System of Negro Slavery in the Confederate States;’ by George McHenry. ‘Narrative of Canadian Exploring Expeditions,’ by Professor W. Y. Hind; presented by the Author. Continuations of ‘Transactions,’ &c.

ACCESSIONS TO MAP-ROOM since last Meeting (Jan. 25).—Sources of the Nile, by Captains Speke and Grant; 8 sheets, MS. Mapa Topografico de la Altiplanicie Central de Bolivia, by Húgo Reck; 1862. New Zealand—Province of Canterbury, showing the Glaciers and Alpine range, illustrated by 12 large-sized Drawings by Dr. Haast, P.G. New Zealand—showing the Seat of War, Auckland; published by the Editors of the ‘Daily Southern Cross,’ New Zealand. Ancient Map of Africa, preserved in the British Museum, presented by his Excellency Conde de Lavradio. Die Britischen Inseln und das Umliegende Meer; by A. Petermann. Special-Karte Süd-Schleswig; by A. Petermann. Plan of the District around Shanghai, under the protection of the Allied Forces (2 copies); presented by the War Office, through Sir E. Lugard, K.C.B. Continuation of Ordnance Maps and Admiralty Charts.

EXHIBITIONS.—Twelve chromo-lithographs of glacier and other Views in the Southern Alps of Middle Island, New Zealand, to

illustrate Dr. Haast's Paper ; from water-colour sketches taken on the spot.

Previous to reading the first Paper of the evening, the PRESIDENT called attention to the series of the above-mentioned beautiful chromo-lithograph views of the mountain-scenery of New Zealand, after which

The first Paper, which was entitled "*On the Southern Alps of Canterbury, Middle Island, New Zealand*," by Dr. HAAST, Provincial Geologist, was read, in which the author briefly summarized the results of his numerous surveys during the years 1861-62-63. This magnificent snow-clad range, from which descend enormous glaciers, reaches in this province its greatest elevation, forming the culminating point of the great back-bone that runs through both islands from north-east to south-west, which is only broken through at Cook's Straits, and rises in the North Island to peaks almost as lofty, such as the well-known cone of Mount Egmont. The pyramidal form is everywhere the marked feature of the huge masses, numbers of which exceed 10,000 feet in height ; while Mount Cook, the highest summit of all, is 12,460 feet, and about 30 miles from the west coast. Between each mountain-system, as it were (some of which, however run for many miles without any traces of a *col*), occurs a pass of varying altitude, generally very inaccessible, some as high as 6500 feet to about 8000 feet ; and these intervening depressions form the watershed of rapid and formidable mountain-torrents which fall into the ocean on the west coast. The eastern flanks are drained in like manner by glacier-streams, which, however, having a longer distance to run ere reaching the east coast, and encountering huge lakes which regulate their flow to some extent, make this side of the range eminently suitable for an emigration-field. Nothing can exceed the beauty of the tints both of sky and vegetation, or the singular glacial anomalies that present themselves on some of the glaciers ; as, for instance, that of the River Godley, which has two waterfalls falling from its eastern edge into two deep gorges, only separated by a buttress of rock, as depicted in one of the spirited sketches made on the spot, which were exhibited at the Meeting. Between Mount Cook and Mount Stokes (in immediate proximity and almost as lofty as the former) there is a deep very abrupt cleft, as it were, constituting a *col* about 7000 feet above sea-level ; beyond which the chain again rises, but is now bifurcated as it proceeds south-west, till a singular gap or break occurs—not above 1000 feet high, with a swamp on the summit, emptying in both directions, and presenting physical features which, it is believed, are without a parallel in any other portion of the globe—through which alone it is possible to reach the west coast from the

eastern portion of the province. This pass will probably be ere long made available for ponies at least. Beyond this singular pass the two chains reunite, as they approach Mount Aspiring on the frontier-line between Canterbury and Otago. All the valleys on either side of the chain are universally densely clothed with forest-trees; but while the chain on its western aspect has the appearance of an undulating rampart, on the east there extend numerous lofty chains running north and south, or at right angles to the main "back-bone," as it has been aptly termed. This configuration necessarily leads to there being an enormous amount of glacier surface, the moraines on which are unusually clearly defined and plentiful. The Tasman Glacier is 12 miles long, and at its lower extremity $1\frac{1}{2}$ mile wide. Traces everywhere present themselves of many of these glaciers having at no remote period extended several hundred feet further than their present limits; and in the course of explaining the drawings, reference was made to several indications confirmatory of received theories of the mode of progression of glaciers under various physical conditions.

The PRESIDENT said he was proud to preside upon an occasion when a gentleman who was a geologist by profession had proved himself to be a good geographer, and had shown how intimately the subjects of physical geography and geology were united. Dr. Haast's labours were worthy of all commendation. His illustrations of the glaciers proved that the south-western part of New Zealand was in that intermediate state which all geologists were agreed upon was formerly the condition of the northern part of our own islands. In his last Anniversary Address he adverted to the belief of geologists, that all the northern part of Scotland was once in the condition that Greenland is at the present day; that is, covered with snow, with glaciers descending from the snowy mountains. In the illustrations and in the Paper which had been brought before them, they had a description of those phenomena as now at work in New Zealand, and in this respect it was a valuable communication, as presenting a history of an intermediate link in the development of glacial action descending from ancient to modern periods.

Mr. COOKSON, at the invitation of the President, pointed out on the map the location of the various gold-diggings and coal-mines in the Otago and Canterbury districts. He also pointed out the locality of the Tirimakau River, at the mouth of which Mr. Whitcombe, the explorer, was drowned by the upsetting of his canoe.

The PRESIDENT related some of the circumstances connected with the death of Mr. Whitcombe, as set out at length in a letter, which, owing to accident, was not brought to the meeting. Sir Roderick particularly dwelt on the bold spirit of discovery which had led this explorer to sacrifice his life, and he was therefore most unwilling that the evening should pass without a tribute to his merit from all geographers present.

The following is an extract from the letter alluded to:—

Extract of Letter from Dr. Haast to the President, dated Christchurch, N.Z., 15th June, 1863.

"Knowing that an Alpine pass, about 5000 feet high, existed at the headwaters of the southern branch of the Rakaia, the Canterbury Government sent Mr. Henry Whitcombe to ascertain if this pass could be made available to

reach the west coast from Christchurch. He reached this saddle on the 20th of April, but, instead of returning, he continued the journey with one of his men, sending the rest of the party back to wait for him on the known Alpine saddle between the sources of the Hurunui (east coast) and Taramakau (west coast).

"Having crossed the pass, he arrived at the sources of the Hokitika, an important river which reaches the sea about 15 miles south of the Taramakau, on the 3rd of May. Although Mr. Whitcombe was an accomplished surveyor, a good mathematician and astronomer, who had worked successfully in India and Australia, he had had no experience in New Zealand travel, which requires not only strong men, able to carry a heavy load, but also hunger, fatigue, and cold, but also a general knowledge of the nature of rivers and the best way of crossing them.

"Owing to his deficient arrangements, Mr. Whitcombe on reaching the coast was so exhausted, that he had great difficulty in walking to the Taramakau, where he hoped to find a Maori settlement, in order to procure some provisions, as they had finished all theirs.

"Unfortunately the few Maories who lived there had left the settlement, so they determined on following the coast to the mouth of the river Grey; for this purpose they had to cross the Taramakau, which is a large and rapid river.

"As no large canoe was to be found, they tied two small old ones together; but when they reached the current, their contrivance began to sink and drift towards the bar. Mr. Whitcombe, who was a good swimmer, jumped into the water and attempted to reach the shore; but, being in such an exhausted condition, he was drifted into the surf at the mouth of the river, and unfortunately was drowned. His companion, who could not swim, had a most miraculous escape; by tying his right hand to one of the canoes, he succeeded in remaining with it, being tossed about for many hours by the advancing and receding waves. He was at last cast on shore, and, on recovering himself, he worked his way up the banks of the Taramakau for a few miles, and fortunately fell in with some Maories, who gave him a few potatoes. He at last arrived at the saddle of the Taramakau, where his former companions awaited them; and I may here state, as an instance of the sufferings which he had endured, that his companions, even after conversing with him for some time, did not recognise him, so much was he altered, and this after an absence of only twenty days."

The second Paper was entitled:—

"*On the Frontier Province of Loreto in North Peru.*" By Professor DON ANTONIO RAIMONDY of Lima (Honorary Corresponding Member, R.G.S.).

Communicated by W. BOLLAERT.

This communication gives an instalment of the author's labours during the past twelve years, to make known the many valuable products of Peru, in carrying out which object he has made numerous excursions in all directions into the interior.

The province of Loreto is as large as all the other departments together, and extends from the Cordillera region of Pasco to the junction of the Amazon with the Jarava, its south-west portion being mountainous, while its eastern districts consist of extensive plains, well-watered and covered with luxuriant vegetation. In the

mountainous region the most prominent physical features are the passage of the Huallaga through a gap in the mountain-chain, and the renowned Pongo de Manseriche through which the Marañon effects its escape. The plains consist of the usual alluvial soil, entirely free from pebbles, which is characteristic of the great South American plains bordering on the Amazon.

The climate of Loreto is hot and moist, the mean temperature being 21° to 22° C. (71° – 73° F.), while such is the humidity that in a few days, boots, clothes, &c., become covered with microscopic vegetation. At midday, however, the thermometer indicates as high as 93° temperature, which, owing to the immense amount of moisture, becomes almost insupportable. The rainfall here is probably at least as heavy as at any other spot on the globe, which the author is inclined to attribute in great measure to the congelation and condensation of the s.s.w. winds upon the snow-covered summits of the Andes, combined with the known phenomena of the north-east and south-east trades upon their eastern slope, as hitherto maintained.

After noticing the layer of sand, 40 to 60 miles in width, which covers the sea-coast of Peru, the sea-shells found in which in large quantities, of descriptions similar to those which abound in the adjacent sea, seem to indicate that it was upheaved at a recent date from the ocean, and commenting on the phenomena of temperature likely to occur from these physical features, Señor Raimondy elucidates his theory that this peculiarity of soil has, coupled with the prevailing winds on the opposite side of the mountain-range, a great deal to do with the climatic extremes already alluded to. He then examines the origin and cause of the network of rivers of the lower region of Loreto, and considers fully what stream is really entitled to be regarded as the parent stream of the mighty Amazon (the name Orellana, imposed on it in honour of its discoverer, has become entirely disused).

A list of affluents follows, furnishing a very much needed contribution to the geography of that region, which concluded, he passes to the consideration of the three main streams, the Marañon, the Huallaga, and the Ucayali; most of the various affluents from the north alluded to or named as flowing through Peruvian territory, having their sources and the upper portions of their course lying within the state of Ecuador.

The roads * entering this extensive territory are only three in number—one from the north, one in Central Peru, and one from the

* Besides these "roads" (as Señor Raimondy terms them, though a recent letter suggests "broken ladders after an earthquake" as a much more faithful and apposite description of them), the author of the Paper mentions several other paths leading over the Cordillera into Loreto province.

south; the capital, Moyobamba, a city of 8000 souls, but covering as much ground as Lima, being situated in the extreme north-west corner of the province, not far eastward of Chachapoyas, with which one of these roads communicates. The soil is a sand-stone so loose that one single very heavy rain will occasionally work a channel of immense depth. The food is chiefly vegetable, and the principal manufacture that of what is known in Europe as Panamá straw-ware. In one province, that of Tarapto, the exchange medium is wax, a hard day's work being remunerated by 4 oz. wax! Several particulars were given of the towns and villages of this immense region, in one of which the circulating currency is large needles, each representing 1*d.* sterling. The universal currency, however, is cotton cloth, which, as in Africa, has a fluctuating value; but always commands its own value in barter.

The mineral products of the district adjoining the rising grounds are rock-salt (with lime-springs near), sulphate of lime, alum, sulphur (pure), iron-ore and lignite; and gold is found on the great river Napo. This whole region has recently been opened up by improved steamers, when it is at least probable that a very great development of trade must take place to Pará and Europe on one side, and to Callao and the Far East on the other. At present, however, the navigation of the river is only open by the jealousy of the Brazilian Government to the Peruvians, in order that they may reach their own country from the Atlantic.

The PRESIDENT stated that Don Antonio Raimondy had been employed during twelve years by the Government of Peru in collecting statistical and geographical materials in regard to the produce of the country; and the Council had thought him well worthy of being elected an Honorary Corresponding Member of the Royal Geographical Society. The subject brought before them was of vast extent, and he hoped there were gentlemen present who could point out the great advantages to be derived from a trade with Peru carried on by ascending the Amazon to those great affluents which flow into it from the Cordilleras. When they considered the comparatively waterless condition of the region on the Peruvian side of the Andes, and also what easy communication all that region could have with the Atlantic by means of these tributary rivers flowing eastward into the great stream of the Amazon, they would see how important it was to the commerce of the world to have this communication opened up. He knew no gentleman so competent to speak upon this subject as Mr. Markham, who had travelled in Peru, and who had written most instructively and eloquently upon that region.

Mr. CLEMENTS MARKHAM said he had descended many of the tributaries of the Amazon a considerable distance, but he had never entered upon the province of Loreto. He had, however, studied the subject of the Paper a great deal while in Peru and since his return to England. It was very remarkable that such an enormous surface as the 2,500,000 square miles which comprise the basin of the Amazon had been so little explored during the three hundred years that the coast-line of South America had been known to geographers. Some daring spirits did in the sixteenth century descend into these forests in search of the lake in which dwelt the man who was covered with gold-dust, and

they penetrated hundreds of miles on foot to points on the Caquetá, Purus, and other large streams, which had never been reached by any scientific or mercantile traveller since their time. They were the great explorers of the Amazon valley. In the succeeding century the missionaries descended some of the rivers, but they appeared to have been very superstitious and very timid. He had in his possession the manuscript journal of one of these missionaries, who observing, one morning, a jaguar crawl along the branch of a tree and pounce down upon a great porpoise, which was browsing upon the banks of a river, and drag it on to the beach, was so dismayed at the thought that a similar fate might befall him if his canoe happened to be under the branches of one of the trees at night, that he relinquished his mission and returned. In the present century scientific men had shown greater zeal and greater energy, and had spent many years of their lives, separated from all their friends, in exploring these unhealthy regions.

He introduced Mr. Bates and Mr. Wallace, as gentlemen who had a personal knowledge of the physical features of the Amazon.

MR. BATES said he had ascended the Amazon from its mouth as far as the Peruvian frontier, a distance of 1800 miles from the Atlantic, and had travelled over large portions of it many times. The breadth of the river varied from a mile and a-half to seven miles. It winds along in lengthy curves, forming magnificent reaches. Every inch of the banks is covered with forest vegetation; indeed, the whole country is covered with one vast matted forest, growing to an enormous height, and presenting a most picturesque and varied scene. It is a very healthy country. He knew Englishmen both at Pará and Santarem, who had lived there thirty or forty years, and they still bore the florid complexions of their countrymen. The whole of this distance of 1800 miles lay in Brazilian territory, which in the valley of the Amazon embraces a region 800,000 square miles in extent, of the most fertile soil in the world. In passing along the river in native canoes he frequently noticed that the banks are composed of a rich crumbling vegetable mould, fifteen to twenty feet in depth. Yet this grand country is almost without inhabitants. The population at the last census exceeded but little 230,000 souls, which is in the ratio of one person to every four square miles. In the province of Archangel, the most forbidding country in northern Europe, the population is in the ratio of four persons to one square mile. In consequence of this scantiness of population in the valley of the Amazon, there was no agriculture carried on. He never saw a plough, and he could count on his fingers the number of hoes and spades that he saw during the whole of the eleven years he was there. The trade is entirely confined to gathering the spontaneous productions of the forest—india-rubber, chocolate-nuts, brazil-nuts, sarsaparilla, vanilla, &c. Timber is scarcely yet become an article of export, though the country abounds in the most beautiful and varied descriptions of woods. The total exports from this country all pass through the port of Pará, and do not exceed 400,000*l.* per annum, of which india-rubber comprises about one-third, and chocolate-nuts one-half. It is an interesting problem how this country is to be peopled. The Brazilian Government have set their faces against the importation of negro slaves, and he was afraid that European immigrants will be of little use in field labour.

MR. WALLACE said he went about a thousand miles up the Amazon and ascended the Rio Negro. During the four years he spent there, he acquired all the information he could respecting the country. The surface is covered with the largest unbroken forest in the world; it is the great physical feature of South America. At the mouth of the Amazon the forest extends only a few hundred miles into the interior, and then you get to the mountainous district of Brazil and Guiana, which is partly open country mixed with wood. Farther up the river an enormous plain opens out north and south, extending to the foot of the Andes, entirely covered with forest. The forest is of such

extent that countries like England, France, Spain, and Germany might be thrown down it. They would be absolutely lost there—you might travel about for years and never hit upon them. It is an interesting problem to ascertain why it should cease so abruptly to the north and to the south. To the north you come at once to the open grassy plains on the Orinoco, and to the south you come to similar open plains on the Paraná. The river is also equally note-worthy from its enormous extent and the isolation of those nations that dwell in the interior. The people, the greater part of them, are utterly ignorant of any other country but their own except by vague report. All their ideas of geography are connected with this river; the position of other countries is conceived of as either on one side of the river or the other. Even comparatively educated people, Brazilians and Spaniards, who have been born and educated there, in questioning him about France and England, have asked on which side of the river they are situated. They imagine that the Amazon river flows all round the world, and that every country must be situated on one side or the other.

Mr. GERSTENBERG gave some particulars relative to a German settlement which, on the invitation of the Peruvian Government, had established itself on the eastern slope of the Andes, in the year 1856, adding that it was the great wish of the country to introduce European emigrants. But to accomplish that object successfully, it was necessary, he argued, that the emigrants should be able to ascend the Amazon by way of Pará. At present the navigation of this river was hermetically sealed by the Brazilian Government against the flags of all nations, except the riverain states, Peru, Ecuador, Venezuela, Granada, and Brazil. But these four republics had no ships, consequently the whole of the navigation was entirely in the hands of Brazil. He mentioned special instances of the difficulties to which this restriction had given rise, and alluded more particularly to a monopoly for 20 years, terminating in 1880, which had been conceded to the British and Foreign Navigation Company, by which during the whole of that period the Amazon would be closed to the commerce of the world. He considered this a great hardship, and he hoped, whenever an arrangement of our present difficulties with Brazil took place, that the British Government would bring forward the question of the opening of the Amazon.

MR. BOLLAERT, the translator of the Paper, said he would advert to only one point—the healthiness or the unhealthiness of the climate in the province which was the subject of the Paper. The only unhealthy parts are some of the valleys which run down from the great chains of mountains, where there are occasional visitations of intermittent fever. But lower down, in the great bends of the river, the climate is perfectly healthy. He had paid some attention himself to the geography and geology of the country, and he thought Professor Raimondy had done justice to both these branches of the subject in his Paper. A serious consideration, however, pressed itself upon his mind, namely, the continued opposition of Brazil to the general navigation of the sea-like river Amazon, and he would suggest, if Brazil persisted in keeping the navigation of it closed, that the Mersey and the Thames be closed to the Brazilian flag.

The meeting was then adjourned to 22nd February.

Seventh Meeting, February 22, 1864.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*R. J. Ashton, Esq.; G. S. Brodie, Esq.; R. C. Carrington, Esq.; Geo. Clowes, Esq., jun.; H. Cunningham, Esq.; Capt. L. Flower; Cornelius Grinnell, Esq.; J. Harvey, Esq.; J. C. Irving, Esq.; C. M. Lampson, Esq.; J. M'Laren, Esq.; Hon. E. Powys; Wm. Rennie, Esq.; R. B. Ross, Esq.; J. Scott, Esq.; N. D. J. Straton, Esq., B.A.; Hon. C. H. Tracy; G. Turnbull, Esq.*

ACCESSIONS TO LIBRARY.—‘The Cotton Trade; its bearing upon the Prosperity of Great Britain and Commerce of the American Republics, considered in connexion with the System of Negro Slavery in the Confederate States,’ by Geo. McHenry. ‘Narrative of Canadian Exploring Expeditions,’ by Professor H. Y. Hind; presented by the Author. Continuations of Transactions, Miscellaneous Periodicals, &c. &c.

ACCESSIONS TO MAP-ROOM.—Map of Africa, on 3 sheets, by E. G. Ravenstein, F.R.G.S. Map of Nord-Schlessing, by A. von Petermann, H.C.F.R.G.S.

The Paper read was—

“*Notes of a Journey from Gaza, through the interior of Arabia, to El Khatif on the Persian Gulf, and thence to Omdan, in 1862-63.* By GIFFORD PALGRAVE.

AFTER recounting how, in order to conceal their intentions, the author and his companions first wandered into Galilee, in April, 1862, where they met the Prince of Wales, while a friend at Jaffa was preparing their disguises, arranging for their camel-transport, &c., an account is given of the characters they respectively played: Mr. Palgrave passing for a doctor, as best calculated to bring him in contact with all classes. On 4th May they left Jaffa, from which period, till their arrival at Bagdad the following year, all trace of them was lost. On the 5th they reached Gaza, their final starting-point, where they stayed three weeks in order to get guides, &c. At length, on 27th May, they left in charge of some Arabs of the Beni-Ahijeh who were to conduct them as far as Maan on the Haj or pilgrimage-route from Damascus to Mecca. In this part of their road they crossed the desert of El Tih, through the rocky gorges of which they travelled for four days, usually on a s.s.e. course. After passing south so far as to be within two days of Akaba, the road turned north-east to Maan, where another detention of twelve days took place. Between this and the Jauf province of the Upper

Nejed is waterless desert, inhabited by the most desperate of all the Bedouin tribes. In crossing this they found but one watering-place, and had nearly perished in a Samûm (simoom of ordinary current use). No living thing was encountered here, but a few serpents and lizards, till the frontier of the independent principality of Jebel Shomer had been reached, marked by the Wadi Serhan. Seven days the road continued through this valley, as far as Magua, a large encampment of the Sherarats, and on 30th June they entered Jâff. Here are groups of lovely villages nestling under palm-trees, and two ancient Christian towers, but not of the Roman period, which command the place and the entrance of the wadi; this being a great centre of commerce for the Bedouins of Northern Arabia.

The kingdom of Jebel Shomer lies between $26^{\circ} 30'$ and 32° N., and $38^{\circ} 40'$ and 44° E., and its inhabitants are part nomad, part stationary, so that both trade and agriculture are to some extent represented, though two-thirds of the area is desert. The inhabitants of the rugged defiles which form the chief physico-geographical features of the country were in early times Christians, and long withstood El Islam. The state-religion is now Mohammedan, but it is only prominent in the towns. Away from these a few loose superstitions seem to represent the religious element.

From this point, after nineteen days' incessant intercourse with the chiefs and people, many of whom were treated medicinally, the party left for Haïl, the capital of the kingdom of Jebel Shomer. Their road hitherto had but one well in seven days' march over a sterile stony tract, alternating with sandhills which reflected the heat till it became insupportable. The entire distance to Haïl was ten days' journey, the latter portion through fertile valleys hemmed in by rocky mountains.

At the capital they remained six weeks, being kindly treated by the King Jelab, whose subjects are described as a fine race. There is really a considerable amount of trade here.

On 8th July they left, sixteen in number, and next day crossed the Jebel Salma, the seat in pre-Islamite times of Koleib-Waâl, whose sway extended over half Arabia. On the 10th they reached Faïd, a village on the road from Bagdad to Medina, and on the 13th entered the kingdom of the celebrated sect known as the Wahabites, whose king, Ibn Saïd, is generally known as the Sultan of Nejed. The road they had just traversed had lain chiefly through long valleys running from north-east to south-west, well watered and abounding in gardens, but monotonous from the absence of mountains. At noon on the 14th, the crest of an elevation

revealed to them lying below, the plains of Kasim, the frontier province of the Wahabites; and Argin, the seat of the local governor, was reached in safety.

Here the climate becomes tropical, as the plateau has been left behind. The kingdom extends over 10° of latitude by 7° of longitude, being bounded west by the Haj road, east by the Persian Gulf. Beradoh, a large town, was reached on the 16th, which is the seat of the Wahabite Governor of Kasim, and is a station for the Persian pilgrims. The inhabitants are enterprising traders, and cotton is successfully cultivated in the neighbourhood. A revolt in the neighbourhood detained them here seventeen days, travelling being exceedingly insecure towards the capital, in consequence of most of the inhabitants of the Beradeh district sympathising with the insurgents.

At length the chief guide of the Persian pilgrims to Mecca offered his services to conduct the party to Riadh, the capital. They passed several towns more or less in size, and on the 7th October reached the large fortified town of Mejmad. On the 9th they crossed a running stream, a phenomenon in Arabia; and in two days, after ascending another plateau, reached the town of Sadek. On the 10th they reached Hormeimeleh, birth-place of Ibn-Abd-el-Wahab, founder of the sect named after him. Here the gubernatorial residence is a palace built by Ibrahim Pasha in 1818. Thence they passed by the large ruinous town of Anjoush, at the mouth of what is called Wadi Henifeh (Orthodox Valley). This city was formerly called Moscilemeh, after a rival of Mahomet (probably the pseudo-prophet of that name mentioned in Gibbon's 'Decline and Fall'), whose capital was at Riadh, and who reigned over this region. Riadh was reached at noon on the 13th October, where the King assigned them lodgings, which they inhabited till 25th November. Some of the houses here are two and even three stories high. The people are, in accordance with the dogmas of their sect, excessively fanatical and austere; and a foreigner's life is far from safe among them. On leaving, the party, now reduced to three, had to avoid the large towns; two of which, Manfuleh and Solemieh, are specified, and concealed themselves in the small valley of Yamanieh till their faithful guide and friend Khalif, who was conveying some Persian merchants, could rejoin them. On his overtaking them, they held eastward through fine plains, camping at water each night. On 1st December they were at a well, where the great caravan-routes meet from Nejed, Hasa, and Harik. Beyond this lies the Dohur Desert, an offshoot of the Great Southern Desert, two days' journey across, forming a plateau, on

descending from which by a rather abrupt descent they found themselves at Hofhuf, where is a strong citadel called Kot. Hasa, where they now were, is the richest and most populous of the Wahabite provinces, the climate almost resembling that of India. Here are workers in metals of great repute, while large quantities of textile fabrics are also manufactured.

Hence, three days' journey without Khalif brought them to El Khatif, on the Persian Gulf, where their faithful esquire rejoined them. El Khatif is surrounded by a net-work of rivers, and is buried in an interminable succession of gardens. Here the party divided, in order to obviate the risk of both losing their lives in the perilous journey to Oman. The author now took boat, crossing the Persian Gulf twice, and ultimately on 3rd March, 1863, reached Sohar, the ancient capital of Oman. Thence they coasted south-eastward, and when their long tedious voyage seemed just at an end, the boat was shipwrecked, nine only being saved out of twenty-one souls on board.

On 9th March they were at Watiejyeh, a day's journey from Muscat, whose monarch they visited at his country palace here, just as they were, shoeless, hatless, and in their torn shirts merely. He received them affably, and next day they went on to Muscat, the road being very difficult owing to the spurs of the Jebel Akhdar, which here run quite down to the sea. Thence, after a stay of twelve days, he proceeded up the Persian Gulf, reaching Bagdad, after a severe access of fever and delirium, on 19th April, and Beyrout on 11th July.

As a general result, all anti-Islamitic races throughout the East are to be found among the mountains.

After returning thanks to the author, the PRESIDENT said that, since the foundation of the Society, they had had no communication respecting Arabia which approached in interest the memoir of Mr. Palgrave. With respect to the exterior of the country, its ports, its promontories, and its coasts, the excellent memoirs of Captain Haines (*v. 'Journal,'* vol. ix. p. 125) and Lieutenant Welsted (*v. 'Journal,'* vol. vii. p. 20), as published in the Society's '*Journal*' had thrown a great deal of light upon that part of the subject. Again, at the present moment, Captain Constable of the Indian Navy was preparing for publication by the Admiralty, some admirable illustrations of, and important additions to, our knowledge of the geographical outlines of the coasts. But with the exception of Dr. Wallin, a Finn, who made himself a perfect Arab scholar, and who had gone a certain distance into the interior, and whose journey is also described in our volume (*v. 'Journal,'* vol. xx. p. 293), we had had no traveller to compare with Mr. Palgrave. He hoped that gentleman would explain more in detail the nature of his route and the difficulties he had to encounter, for these had been only slightly alluded to in the abstract which had been read. There were three subjects which he hoped the author would specially illustrate:—First, as to the dissimilarity between the Bedouins or nomads of the north of Arabia, with whom alone we had been acquainted, and the people of the

Wahabee country, a remarkable nation in the interior, among whom Mr. Palgrave had resided. Next, he should like to know something about that remarkable race of Sabæans or Fire-worshippers, who had never been described by any traveller in Arabia. Thirdly, as to the famous breed of Arab horses in the Nejed, Mr. Palgrave could, he was aware, communicate some curious particulars.

MR. PALGRAVE.—Before addressing myself to this Society, which I am happy and proud to meet this evening, I must apologize in a few words for the probable insufficiency of command which I have over the English language at the present moment, having been nearly eighteen years absent from England; and consequently I may suppose that either Arabic or some other language might be more readily at my tongue; however, I will do my best (though I can hardly hope to be successful) fully to satisfy the curiosity which I know prevails among many present: it is, I fancy, pretty much the same for me as for myself, and which finally determined me to undertake a journey of which you have just heard an abstract—since we have often heard much of the coasts of Arabia, and we know more or less what the sea-line is, and what the border-provinces of Arabia are, but of the interior no real information has been given, at least with due accuracy and detail.

It is true we have had many valuable accounts of the formation of the Wahabite kingdom, which is one of the most remarkable phenomena which have taken place within the last century; I mean such information as may be had from the travels of Niebuhr, which are of the greatest accuracy as far as they go, or those of Burckhardt and other voyagers; but no one could describe these countries as an eye-witness: so it seemed to me important that we should at last know from an actual visit, and by our own inspection, what may be really contained in that enormous peninsula which stands out in the middle of the map like a kind of unknown country, surrounded by many others far more distant, yet much better known—such as Persia, India, and even Africa, at least at the present day. I wished to obtain as far as possible accurate information, not only of the country itself—I mean of the geographical or physical condition—but more especially of the inhabitants; of their governments, their divisions, their subdivisions, and of the forms of religion and manners that might exist among them. I had already—during about ten years' residence in Syria—suspected by the language of those who had been furthest towards Central Arabia (whether Arabs or others who had travelled in that direction), that there was a something positive in the way of a government, of a settled country, and of manners and institutions, to be found, could one only get at it.

But this “to get at it” was the very difficulty, on account of the extraordinary jealousy of the population with respect to Europeans; for to be known as a European traveller, at any rate in the Wahabite country, that is to say, in the central plateau of Arabia, would be exceedingly dangerous, possibly even fatal. Again, passing one's self off even as a Turk would not be exactly the way in Arabia, where Turkish dominion is not known except to be hated, as in the Wahabite country. Again, the religious character of a Dervish, though it may do very well on the road to Mecca, and in the neighbourhood of the Turkish provinces, would be an inadequate pretext to traverse the central plateau of the country. Consequently, I thought the best plan before me was to take the character of a physician; and having some slight knowledge of medicine, which I was sure would be much more than I should find before me in the country, and being sufficiently acquainted with the language to pass, if not for an Arab of *pur sang*, at any rate for an inhabitant of Aleppo or Bagdad, or one of those frontier-towns, I determined to set out under these appearances. However, in order to accomplish such a design, I was obliged to deprive myself of many means of which I should have gladly availed myself, such,

for instance, as sketching or taking notes before people, or having with me geographical implements or similar objects. Of course I was obliged to put these entirely out of the question; and not only that, but I was obliged not to appear curious, when at the very moment I was, of course, most desirous of obtaining the fullest and exactest information. In a word, I was obliged to look as great a simpleton as I possibly could, and to seem to care about nothing else but to get my fees, which was not always easy, because the Arabs only pay the doctor when he has succeeded in effecting a cure.

However, this profession answered very well in the long run, because it brought me into communication with every rank and with every character of person whom one could meet with in the countries thus traversed during a journey which lay in a more or less diagonal direction nearly across the whole of Arabia; and at the same time I could thus, under different pretexts—such as that of inquiring about patients and medicines, or similar subjects—ascertain what was going on even in the neighbouring provinces, which I was not able to visit in person. As I said, in the first place, there are no good doctors in Arabia, or else it might seem almost audacious to say that the fame of my medicines sometimes often gained me patients for several days' journey distant; and this I was glad of, not of course for the sake of the remuneration, but on account of the news which I could thus obtain of the countries from which they came. On some occasions I found persons who had come to visit me and ask for medical advice from ten or even twelve days' journey distant; and these frequently proved to me a very valuable source of information.

Well, let us cut this short; for of course, in one evening, it would be impossible to give a detailed account of all such circumstances. What has just been read is simply a skeleton of the route itself, without entering into any particular details. As, however, the honourable President has alluded to one or two points, which he very justly thinks it would be fitting to dwell upon, I will briefly mention them as far as I can in a general way; and shall be happy to answer any questions which may suggest themselves, and which may throw light upon the details.

Now, the first point that struck me in Arabia was this:—Having been always accustomed to consider Arabia as a kind of home of the Bedouins, a sort of enormous plateau of bad pasture, over which an uncertain number of Bedouins and camels might be continually walking up and down, with tribes interchanging wars and alliances with very little fixity: I found, on the contrary, that the Bedouin population was almost limited to a desert-circle surrounding Central Arabia; and that the great mass of this Bedouin population is concentrated upon the northern frontier, upon the limits of the desert which divide Arabia from Syria, and that once within the limits of Arabia itself south of the Jäuf, which has been already visited by Dr. Wallin, the stationary or fixed population was much more numerous and infinitely more important than the Bedouin population; and that that proportion of the fixed population over the Bedouin increased the further south I went, until in the central Wahabite provinces, which are strongly marked by a mountainous line around them, in many provinces not a single Bedouin, properly speaking, could be found; the whole of the population being fixed, and the few Bedouins who subsisted in the Wahabite empire being entirely in a state of servitude—in fact, crushed by the force of the Arab Government.

At the same time, these governments and these countries existing in the interior of Arabia are well organised, exceedingly centralised; in short, they are regular and established monarchies existing with known traditions, fixed laws, and in a form better regulated, perhaps—of course I say it without any ulterior meaning but merely as giving an illustration—than most parts of the Turkish empire. Great was the effect produced on my companion, who had come with me from Syria, when arriving at the Wahabite country; and he

remarked to me, with much astonishment, that this really seemed to be a government—a thing which he had never met with in Syria.

The principal divisions of this vast region which I noticed myself, were the three following:—First, the Northern, of which the capital is Hail (visited as you know by Dr. Wallin), and which is called the province of Jebel Shomer. "Jebel" means mountain, so it is as if you were to say, "the Mountains of Shomer." The capital of this province is called Hail, a town which at the present moment contains about 20,000 inhabitants. It is a very respectable town in its way, with a good market-place, tolerable shops, and a grand palace belonging to the Government in the centre; it is surrounded by fortifications and walls. In the town resides the actual king of the province, of the name of Zelal Ebn Rashid; and this kingdom was only founded in the time of his father, whose name was Abd Allah Ebn Rashid: so that it is a kingdom which has lasted altogether about sixty years, but which is, at the present moment, very well organised and subdivided into several provinces, in each of which is a governor dependent upon the central king, and the whole under the control of one administrative and executive power.

The second Government, which is yet more remarkable, is the Wahabite Government, which occupies nearly the whole of the interior of Arabia, stretching from the Persian Gulf to the neighbourhood of Mecca. It does not come down quite to the Red Sea, because Mecca and the adjoining province of Hejaz are under the protection of the Turkish Government. With that exception, the whole of Central Arabia belongs to the Wahabites. There, again, we have a monarchy, and a monarchy of the most absolute form—a despotism, I might say, such as perhaps has seldom been seen in Europe—a despotism to which any you might read of in history, or hear of in the newspapers, would bear but a faint resemblance. I could not have imagined such an entire political and religious absolutism as that existing in the Wahabite country, and of which I will afterwards say a few words. It is at the same time a government perfectly well organised, and divided into eleven distinct provinces, with their separate governors, and subordinate governors under these, with a certain number of military men to be levied from every town and every village, with fixed taxes and duties, and whatever attends on commercial and agricultural life.

The third main division of Arabia which I visited is the government of Omàn, which appertains to a personage who is known in our books as the Imam of Muscat, although that title does not exist in the country itself; Muscat not being in reality the capital of the kingdom, and the title Imaum being unknown there. However, the name was given by the Portuguese in the time of Albuquerque, about 300 years ago, and writers have since retained the word Imaum, which, however, is applicable to the Wahabite king, and not to that of Omàn. The royal capital is, in fact, the town of Nezwah, which is at some distance from the coast, in the mountains higher up. Muscat is, however, at present in a way the most important town, as being that with which most European commerce is carried on. The kingdom extends from the limits of the Wahabite country along the coast, and goes away into the interior, and then down again towards the territory which is known by the name of Yemen. Between that and the Wahabite country extends the Great Desert, whither there would be very little object in going; and if one went, very little hope of returning. The Arabs themselves hardly ever traverse it in a regular way, if even they journey in it at all. I only found two Arabs of the country who were introduced to me in the village as remarkable men on this very account, that they had traversed the whole of the Great Desert. I asked them what they had seen, and what was to be found in it. They described it to me as such a desert as I had seen: in part, moving sand, little oases or semi-cultivated spots where a scattered vegetation might be found, a few dwarf palm-trees, and a little brackish water, with here and there negro

villages and an Ethiopian population, which seemed to be, as far as I can judge, the very Himyaritic population about which a great deal has been said in France lately: they appear to be an Abyssinian colony.

I was able to stay in each of these countries a considerable time, and to make acquaintance with the chiefs and with the principal members of society, so to speak, in these different provinces. At the Wahabite capital (which is not the old capital of Derayah, for that was destroyed by Ibrahim Pasha, but the modern capital of Riadh, which is about half a day's journey to the south-east of Derayah), I remained nearly two months, lodged by the hospitality and at the expense of the Wahabee king, as his privileged physician for the time being: residing under his royal protection, my art upon such has had the good effect of making me come under it. While there, being in continual communication with the court and with those who inhabited the court, and also with anybody else who came to ask my advice during that time, I was ever looking into the life and habits of the inhabitants, and watching them as closely as possible.

Now, I think it would be proceeding in accordance with the wish which has been signified if I were to say a word or two about the administrative system of the Wahabite Government and the nature of its religion. The religion of the Wahabite provinces I must touch upon, because in the East religion and government always go together in so remarkable a manner that the distinctions between nationality and nationality, or government and government, are very often mainly, if not entirely, dependent upon the different forms of religious opinion which may prevail in the countries. Such is the fact, whatever comments it may give rise to, and it will naturally give rise to a great many; and consequently, in speaking of the Wahabite Government, one must first speak of the religious opinion, in order that you may understand the form of their government. The character of their religious opinion is this: Mohammedanism in its strictest, its most primitive form, exactly such as Mohammed conceived it, such as he taught it to his companions, and such, with very little exception I believe, as they preached it. It seemed to me, when I was in the country, that I was actually living in the age of Mohammed and his companions. The exactest picture that could be drawn of their way of living, their way of thinking, and their way of acting, such as you have it in the contemporary traditions of Mohammed, you may find at the present moment in that population. This is not very astonishing, because it is an entirely unmixed population; they have never married, nor been given in marriage, with any other people. They have entirely kept aloof from other nations, they have had very little commercial correspondence with any other people, hardly any political intercourse with such, hardly anybody has ever visited them, and they hardly visit any one; in consequence they have remained, so to speak, fossilized in the midst of a changing world. I should fancy that on the face of the globe, perhaps, no nation has changed so little. They have not gone back; they have not gone forward: they have not advanced, as far as I can judge, in civilisation, from the accounts which I have of Arab life at the time at the time of Mohammed, nor yet have they retrograded. With the fixity peculiar, I believe, to the Semitic families, of which we have such a remarkable and well-known example nearer home in the Israelitic race, they have remained exactly at the point they were; and thus have they retained, yet not improved, their primæval condition. For instance, a stranger who presents himself, like myself—What was I known as? I was known as a travelling doctor; an expression not exactly synonymous with a quack in that country. I might be a respectable person—that remained to be seen—and even a good doctor, for aught they knew. I was known in the town, generally speaking, as a Christian; for though, of course, in that country they never ask you directly what your religion is, that question not being considered polite, at the same time it is very easy to find out whether a man is a

Mohammedan or not, who is in a town where everybody is—according to an expression used in one of Captain Head's works—obliged, under the fear of the Lord and a broomstick, to attend daily at public worship, and if any person of the town is not present at the prayers he is sure to be well beaten: and thus any person absenting himself from them must give good reason for his doing so. I might have been a bad Mohammedan, but they seldom took the trouble to ascertain that. I was known, in consequence, as a native Syrian Christian. They knew that I came from Damascus; that I made no great secret of in the country, for I published it to everybody. I was there set down as a Christian of Damascus. Well, nobody said a single word that could possibly insult or reflect either upon the religion or upon the country to which I was supposed to belong, although I was supposed to belong to the Sultan's Government, with which they were almost at war, and to come from a country with which they had no sympathy, and to belong to a religion regarded by them as infidel. I met with the kindest reception and treatment almost everywhere. I was very hospitably received, very kindly treated, and well lodged. The dwellings there are not tents, but very respectable houses made of unbaked bricks, because in a country where there is little rain, indeed, scarcely any at all, and the tenacious soil becomes as hard as any stone under the influence of the sun—for in these regions you may imagine what the sun does—there is no need of baked bricks; and the houses are as firm and solid as any house in London. They are even built with a certain kind of architectural beauty; they are also very respectably furnished with carpets, cushions, and everything else that will conduce to the comfort of the inhabitants. Nobody can enter without permission. They have locks and double locks upon their outer and inner doors. They have often a garden in the court of the house, in which they sit and take the air, as they might in many European towns. In fact, there is a certain amount of exterior comfort. I remained there fifty days, and should have remained there very well contented, and very well viewed by everybody, were it not for the singular character of this Government, occasioned by the particular fanaticism which has developed the Wahabite power, and which ultimately caused me to leave the country in rather a precipitate manner.

You know, of course, that about 100 years since, at the time when Arabia was in a perfect state of anarchy, and when religion had fallen into a strange state of confusion,—of which I will, please God, speak a little afterwards, when I have finished about the Wahabite, because it touches upon the point of the fire-worshipping:—at that time there arose a celebrated fanatic, Mohammed Ebn Abd-al-Wahab, who founded the Wahabite sect, but did not found the dynasty, as some have supposed, having been simply a religious teacher. He, by means of his doctrines and his teaching, having placed them in the hands of a very important chief of the neighbouring town of Derayah, enabled that chief to become the founder of a new dynasty. This chief became the instrument—the means the sword—of propagating the doctrines of Mohammed Ebn Abd-al-Wahab, which are called the Wahabite doctrines, and which are, in fact, the purism of Mohammedanism—primitive Mohammedanism—such as it was at its first origin. There were, then, two families side by side—the family of the founder of the sect, and the family of the founder of the government. These two families remained together in the capital; the one exercising the religious functions generally existing in Mohammedan countries—I mean where Mohammedanism is strictly practised—such as the function of Imaum at the public prayers, a kind of preacher or sort of clerk, nothing more; or the function of judge, which also is, as you know, a semi-religious function in Mohammedan countries, legal questions being decided from the sacred book—the Koran; and the other exercising the governmental power of the country. There is no need to relate to you how this government was developed—how it conquered almost the whole of Arabia—how it quarrelled with the Turkish Government

—how Ibrahim Pasha was finally successful in invading the country and destroying the capital,—and how, after a long while, the shattered elements re-constructed themselves and formed the existing Wahabite Government, whose limits, although considerably extended, do not at the present day contain more than one-third of Arabia. From these two families radiates up to the present time the double principle in the capital; the reigning family representing the political and executive force, while the family of the original founder of the sect having no direct political position, nevertheless exercise an enormous religious influence in the town, and have always a great command throughout the empire, and even over the monarch himself; a force which they exercise in what one may call a narrow or fanatical manner, and in such a manner as to draw the cords tighter, and to render their nation more and more exclusive, and to foster the hatred of the nation against all who might not be of the same way of thinking as themselves.

About six years ago the cholera visited that country at the end of its world's journey. It took Central Arabia at last. The Arabs had never seen anything like it before. They had not at the moment the advantage of having such doctors as myself amongst them; and the result was that an enormous mortality took place. Of course they took fright, and the zealot party, who represented the family of the old sect, took occasion to say that this was a Divine vengeance upon the people for having relaxed from strict principles. What are their strict principles? In the first place, smoking tobacco is a deadly sin; and whatever you may imagine in the way of horror, of condemnation, or turpitude, comes entirely short of smoking tobacco. I am sorry to say that the cholera showed the necessity of something very severe being done to bring back the people to good order. They had begun to smoke tobacco, which in their eyes fully explained the invasion of the disease. To give you an idea of their hatred to smoking tobacco, I will relate a simple incident that occurred to myself. There was a very severe and zealous bigot, one of the family, who came to me to ask my advice upon a little affection of his throat, and my medicine had been successful. I had been about twenty days in the town, when one day when we were sitting together, I was determined to see what were their real thoughts about smoking tobacco, and what was their real standard of morality. So I appeared to be very anxious to inform myself of certain points in order to settle some scruples in my own mind; and after a suitable prelude, I began to say that the Syrians were very much divided as to the distinction between great and little sins—that distinction is to be found in the Mohammedan religion as well as in the Christian—the great sins being those that are punished in the next world, and the little sins those which are to be expiated in this world by saying “God forgive me,” or the like. I stated that my own conscience was rather anxious in the matter; and I wished to know from my friend what he and his family conceived to be the distinction between great and little sins, and which were the great ones that were to be carefully avoided.

My friend looked very grave, as those people usually do; they have a very serious appearance, having their handkerchiefs always pulled down over their eyes; and so putting on an exceedingly serious, pharisaical look, in fact graver than usual, he said: “The greatest and first sin was Polytheism, or worshipping anything else but God.” I said that we all knew that Polytheism is the greatest of all sins; but, after that, what is the next great sin? Upon which my friend, without the slightest hesitation, answered that the second irremissible great sin was that of “drinking the shameful”—meaning smoking tobacco, smoking being called drinking, and the “shameful” being the synonym for tobacco; and consequently he stated this to be the second great sin. Whereupon I suggested, “and murder, theft, false witness, and similar actions?” “Oh!” answered he, “God is merciful; those are all little sins.” Hence the two only mortal sins were Polytheism and smoking. On the occa-

sion of the cholera-visit, already mentioned, it was said that it was all in consequence of smoking tobacco, and of wearing silk dresses; which is another dreadful sin, and entirely to be prohibited. As for the hatred to smoking tobacco, that, perhaps, might find an echo even nearer home; but as for wearing silk dresses, I fancy that even where tobacco is not liked, that would hardly pass. Then, again, swearing by another name but that of God is a positive idolatry, which renders a man worthy of death. Don't imagine on that account that they do not swear; but the natural result of this is, I am sorry to say, to make the transgression of the Commandment which forbids the taking of the name of God in vain, a great deal more common than it would otherwise be. They will swear on every occasion, and they bring the holy name in every moment. The Government was in a state of great anxiety, and considering that the cause of the cholera was due to the fact of pure and primitive Mahomedanism being no longer observed, they resolved that something should be done to stop its progress. On this occasion the reigning king, who is the son of Zurki, the son of Abd Allah Ebn Saoud, who was put to death at Constantinople, called together the gravest and most religious men of the empire, who may contain at the present day about thirty thousand in all. It is a very beautiful and populous town. Except Damascus, I have never seen a town so beautifully situated than that of Riadh. Riadh means "The Gardens," from the lovely gardens which surround the town on every side. The King, then, called together his council, and said:—"I discharge my conscience upon you. I cannot myself look after all the religious observances and exact moral condition of each town or individual in my empire. I have called for you as the most respectable, most venerable, and most important of my people, and I discharge my conscience on your conscience, and I charge you before God to see to it." The most absolute kings are generally the most constitutional, because they are obliged to be so. On this occasion a council of twenty-two was formed. These twenty-two were to be chosen from the most unspotted, the most fanatic characters that could be found in the town; and several of them were of the family of Mohammed Ebn Abd-al-Wahab. They had full power given them, censorial power, like that in the old Roman time, full and absolute power to examine into and to punish whatever offences might be committed against morals and religion in the towns, in the provinces, in the empire; and all this was by delegation. They were immediately all armed, as a symbol of their power, with a long rod, a rod which was rarely suffered to be idle, attended by a quantity of satellites, bearing in their hands the sticks of palm-tree, no despicable cudgels, and a common implement of fighting in the East. They were commissioned to examine into the public and the private life of everybody, without distinction, beginning from the royal family downwards, and punish every one whom they found guilty. The brother of the King, in whose house I had been lodging, was convicted of having smoked tobacco, and was publicly hoisted and beaten at his own palace-gate by these people. One of the principal members—I won't say of the Cabinet, because I do not wish to insult English names by using them in this way, but I don't know how else to explain myself, for they are a ministerial body; there is a minister for external affairs, a minister of the interior, and others; it is really a kind of cabinet—well! one of the principal ministers, who had charge of the treasury, was so well beaten that he died the next day, because it was proved against him that he had committed some offence of an analogous character. Many others were put to death at the same time. Prayers five times a-day were enforced also on pain of beating, generally severe, in case of non-compliance. Even talking in a private house after evening prayers until morning prayers was prohibited, everybody being supposed after saying his last word in prayer, before going to sleep like a good Mohammedan, and not to talk again until the morning. In the streets of the capital and of the principal towns, up to the present moment, children cannot

play. Everywhere else throughout the world you see them playing:—in this town alone they cannot; or if they do play, it is at going through the form of prayer, having no other form of diversion but that. The strictest and most rigid discipline that could be imagined was enforced, and, of course, the natural result followed, that an enormous amount of vice and profligacy increased in the town, much more than had been before, as always will happen.

If you wish to have an idea of the children of the country I will give you an instance. One of the principal dogmas or opinions of these Wahabites is this,—the absolute, universal, all-pervading, all-existing, power of the Divinity in everything; that is to say, that nothing is angelic or human, or even animal action, not even physical—everything is divine. For instance, if I take up a pen, it is not I that take it up—of course I am speaking now in the Wahabite sense—in their sense, literally speaking, God takes up the pen. Again, if I lay it down, the same. If a man writes, it is not the man, but God that writes. If fire burns, the fire does not burn of itself, but it is God that effects the burning. If a stone falls, it is the same. And from this, in consequence, springs up the most absolute system of fatalism that can be imagined. I said that I would give you an idea of the children of the country, that you may see how they grow under that kind of teaching. One day my companion and myself—it was in the month of October, when the heat was still considerable, though it afterwards rapidly diminishes, so that in December it was already cold enough to have fires in the morning; however, in October it was still very hot, when one long day, after a hot day, giving advice from morning to the afternoon, of course I felt the same time non-medical information from the people, and feeling very tired, for there had been a crowd of people during the day, about 3 o'clock I shut up the house and the shop, for the shop and the house were all one, and walked out of the town with my companion, to hide ourselves in a grove of palm-trees in one of the neighbouring gardens—there, of course in private, to enjoy the nicotian weed, which we could not do in the town; for, although it was known, I am sorry to say, by the fatal testimony of the vapour that it always produces, that I did smoke, at the same time I took care not to do so offensive a thing before them. My companion and I, who was as bad as myself in that respect, had retired from the crowd, and got out of the town and beyond the walls, and coasting along the gardens, turned aside into a nice little orchard, where we sat down under a palm-tree, lit our pipes, and enjoyed ourselves. While sitting there we saw, to our great dismay, a lad about twelve years of age—one of the poor lads of the town—walking about not far off; and, seeing us from a distance, of course he came up to talk with us, for an Arab is the most sociable creature in the world: he cannot avoid talking, especially to a stranger, and he will always converse in a friendly manner. Well, this boy saw us, so I said to my companion, "He won't matter, this is a poor fellow; we can go on with our smoking before him." We continued smoking, and the lad came up, habited in the dress of the country, a long kind of robe, resembling more a night-gown than anything else—a long shirt, fitting quite closely at the collar, and reaching down to the feet, and a kind of handkerchief about his head. The lad came up and made his salaam. He was spinning a peg-top on his hand. He saluted us; we answered his salute. He wanted to talk, but he did not know exactly what to say; sometimes people are thus awkward at their first meeting. So, in order to introduce a subject, he took his top in his hand and spun it on his left hand, then took it upon his right-hand forefinger, and keeping it spinning while holding it up, he said to us, "Not by my strength, nor by my cleverness, but by the strength of God, and by the cleverness of God." Whereupon my companion answered, "You have set God to work for very little." From this little incident you can thoroughly understand how that way of thinking prevails among the people of those countries from their

earliest years, and you may judge how far it renders them incapable of change or advancement.

Well, I said I would say a word or two about the town, and the manner in which I left the town; for in that manner the character of the country can best be exhibited. I had remained about thirty days in the town, and during that time was strongly supported by the Royal party, that is to say, the governmental party of the town, because I had cured a great many of them; and I was almost every evening at the palace, either with the King or with some of his own people, and was looked upon in a favourable light. At the same time those twenty-two zealots, I cannot call them fanatics—fanatics is a general word, they were officially so, not only fanatics in matter of fact, but fanatics because of their position—but, however, those were my enemies, because they knew me to be a Christian, or what they called a dangerous person—a revolutionist, a person to be looked on with suspicion, who probably is machinating something against the church or state, or against both; in which conjecture they were not very far wrong, although it was not to my interest to tell them so. The fact was these men were always working against me as much as they could; and I was upheld for a long time by the Royal party. However, the waters began to get troubled.

The first symptom I had of suspicion in the Royal party and the King himself was this. I had notice given me that those who went to that country hardly ever returned, and that scarcely anybody, in the first place, ever got admittance to the capital, much less to the presence of the King; but when one did, one was in danger of two things: either of being put to death, which is by no means an uncommon thing in that town, for the present King has put to death a great many after inviting them; or if you are supposed to be a person whom, on the one hand, they are afraid of, or, on the other hand, whom they have too much regard for to put to death, they offer you a house, and attendants, and wife; and when you are once fixed in the town, once married, you are caught, and cannot get out again. I once met, myself, a very clever fellow, a native of Bokhara, who had been caught in that manner, and who wishing to get away could not do so, being tied by those chains which are well known to be the strongest. The first symptom, then, I had of mistrust manifested itself in this way. I had a particular invitation to go and see the King, at rather an unusual hour, in the palace. The King, after a long preamble of the services which I had already rendered, the great effect which my medicines had produced, and so forth, told me that I was too valuable a person to lose; and he offered me then and there a fine house with attendants, and servants, and with an honourable alliance in the town. Of course, I understood what that meant. I fought off as best I could, and so effectually that the King was obliged to accept my refusal. However, I felt from that moment that I was becoming an object of suspicion. The next thing which got me into bad odour with the King was a thing which I had a great deal of difficulty not to do. While I was playing, so to speak, the part of the poor dependent man amongst these people, I could not help letting it very often appear that I was more independent than I ought to have seemed. Now about this time one of the King's horses had a kick in the shoulder which had festered, and had produced a certain equine disease. The King asked me whether I could cure the horse. I was too glad to get hold of an opportunity to see the Royal stables. They are in some respects the first stables of the world. It is well known that the first breed is the Arabian breed, and the best of the Arabian breed is the Nejed; and, of course, the very best of the Nejed breed would be at the stables of the King himself. Whatever one can imagine in the way of perfect beauty of horses, I was now privileged to see. I never could have imagined such perfect animals, although I have seen the very best horses of the sort which are imported into Europe. Those which go to Europe are either, like those which go to France, of the Algeria or Barbary breed, or like

those which are sent from Syria to breed in the desert to the north of Arabia running up towards Damascus and so on; but never was a Nejed horse sent to Europe, and they never will be. They are never sold by any chance, neither male nor female—they never sell a horse of that breed. They are only to be got in one of these ways: either in war, or as a present, or a heritage from father to son; they are never sold and never bartered. They are a small breed, not very high; I believe never above 15 hands 2 fingers; none of them approached 16 hands. About 14 or 15 hands in height would be the average. The prevailing colour is gray. I did not see a single dark bay; chesnut a fair amount, grey very common, mottled not altogether uncommon, very few white, and still fewer black. I did not see a full bay among them. The principal features of the race are the excessive cleanness of the legs—in this more resembling a stag's legs than a horse's—the fulness of the haunches, the extraordinary delicacy of the muzzle, the beautiful set-on of the tail, and the extreme slope of the shoulder-blade, which gives the animal a pliancy such as I never saw in any other breed, very different from the Persian breed, and even from what is called the Arabian breed of Upper Arabia. I had full leisure for examining the King's stables. There were in the stables about 180 horses, and there were a great many others that were not present.

After looking them over I asked to see my sick horse, and it was shown me. I gave some slight prescription, and thus got another opportunity to visit the stables. After that the King pressed me very much to go on with the cure. I said I had seen the horse; and I felt I was compromising my own position very seriously in doctoring an animal for a disease that I knew little about. I was obliged to explain to the King that doctoring a horse was one thing and doctoring a man was another. The King insisted upon my doctoring the horse. At last I got angry and I said, "Your Majesty must please to remember that in this country I am a doctor for asses and not for horses." The King understood the joke perfectly well, and it did not please him.

Matters went on in this way until at last they came to a crisis, which obliged me to leave the country. The King had already become a little indisposed towards me. Those who were my enemies of course took every occasion to turn the King against me, and at last they found the means of doing so. There was a man in the town who had a species of facial palsy, of a kind which I judged might be treated, according to some practitioners, by an external application of strychnine. Everybody knows the exceedingly small quantities in which such a drug can be administered even externally, as well as the exceedingly powerful effect which it produces, let the administration be the most cautious. The man whom I had to deal with was nearly deaf, besides having an impediment in his speech. I judged that an external application of strychnine with appropriate treatment would produce a good effect, if applied in the manner which anybody in the faculty can understand. Of course the effect was very strong, as might have been expected. I must remark, that with the Arabs you may always double the dose, because they have very strong constitutions. The effect was such, that after four or five days the individual entirely recovered the use of his tongue, and was able to take part in conversation. The patient's hearing was also very nearly restored, and he was in fact going on very well.

This produced a great effect in the town. Everybody was very much surprised, and especially that so much effect had been produced by so small a quantity of medicine. The fame of the cure reached the King. The King sent for me; and as his Majesty was fond of dabbling in medicine, and wanted to understand more about it, he was very curious to know what this wonderful drug was, and asked me to give him some of it, so that after I was gone some of his people might use it. I of course fought shy, from the natural feeling which anybody would have of putting such things into the hands of an ignorant man; and, without reflecting on what consequences my words

might have, somewhat rashly explained to the King the exceedingly dangerous nature of the drug, and that it was one of the most deadly poisons known. He had hardly heard that, when, lifting up the handkerchief which I wore over my head, and lifting up his own, which is the custom when people want to talk a secret in Arabia in a manner inaudible to those present, he whispered in my ear, "Give me some of it!"—in a most unmistakeable tone.

Now the King had very powerful enemies in the Court, and these enemies were in the town at the very time. It was well known that he would be exceedingly glad to get rid of them, and that they also would be glad to get rid of him; and it was known that he was a man who stuck at nothing, who had put his own guests to death in his own house, and consequently he was a person perfectly capable of using the poison, if not in a legal, at any rate in another way.

I feigned not to understand what he meant, and to imagine that his enormous zeal to have it was entirely to do good. So I fought off, and said, "I am afraid you would not know how to use it, nor understand the proper proportions," and so on. Like a judicious man, he did not press the subject any farther. The next day he brought it on again, and again I put him off. The third day he again brought forward the subject in question, and asked me for the third time to give him some of the drug, saying, "I believe you really do mean to leave the country shortly, and you must first give me some of it." I lost patience, being very provoked at his asking me again and again to give him the poison after my repeated refusal. So I told him positively, and in the most solemn manner I could assure him, that I would never give it to him. He still insisted; whereupon I looked him in the face, and said, "Abd-Allah, I know perfectly well what you want it for, and I don't want to be your accomplice in what you will have to answer for before God's judgment seat, nor to be charged with crimes that you will be charged with. You shall never have it." At these words his face changed in a frightful manner, and became positively black. He looked more than words could say. However, he added nothing more for the moment. With customary Arab self-possession he said nothing, and swallowed the insult. I on my part dropped the subject, and after sitting a while I got up and took my leave; but I saw that such a conversation must necessarily lead to sinister results—in a word, that I had committed myself.

The next day and the day after I had no further news from the palace. On the third day, at night, between nine and ten, I was sent for suddenly to the palace, and was informed that I was to go alone. I told my companion to keep awake, and to keep the fire up, because it was the end of November, and "that there would be news to-night." So I went alone to the palace. When I got there I found the King sitting in an inner chamber, by the light of a fire. Around him and in front of him were sitting my most deadly enemies, including the great-grandson of the founder of the sect, who, as the Arabs say, would willingly have eaten me raw, could he have done it. There were two or three others of the same stamp who hated me as much as they could, and a few others who were my friends as long and as much as his Majesty should please to be so. All this was at night, and in an interior apartment. Of course when I entered I saluted the King. In these countries one does not use the long formulas of Turkish salutation, which are considered by the Wahabite as derogatory to the honour which ought to be paid to the Supreme Being alone. Instead of saying "My prince," they say, "Peace be with you, thou who art guarded" (i.e., "by God"); no other title is allowed. He answered my salutation very coldly, and told me to sit down. I sat down close by him, on which he turned round to me, and began by saying, "I know perfectly well what your real object is; it is not medicine, nor anything of the kind: you are really a revolutionist. You come here against our Government and against our religion. You know the penalty is death, and I shall put the law in execution against you, and have you executed without delay." His saying so put me in mind of

the proverb, "Threatened folks live long." I thought it was hardly probable he would do it at the time, though he might put his threat in execution a little later. So I thought the best thing was to seem unmoved. I looked at him, and merely answered him with the common phrase in the East, "Beg pardon of God!" It means, when a person says anything foolish, "Beg pardon of God for saying such foolish things." He looked surprised, and said, "Why?" I said, "How could you kill me? You dare not." He said, "Why can't I? why dare I not?" I said, "Because I am your guest; have been lodged in your house; have been employed by yourself, and as such I am known to everybody in the town, and looked up to by everybody in the town, even by you. You talk of putting me to death! It is perfectly ridiculous! You cannot do it, and you dare not." He answered me that it might be done without its being known that he did it, and that he had the means if he chose. Upon which I answered him that he could not do even that. He asked, "Why?" "Because," I said, "there are several sitting here who have heard what you say; they have tongues, and they will talk about it. I will take care meanwhile to let everybody know what you have said to me to-night, and if anything happens to me in the whole region which lies between this town and the Persian Gulf, it will be known who has done it." I added, "Your brother will be the first to know it." His brother was almost as powerful as himself, his most deadly enemy, and the very person whom he wished to kill. After half an hour's more conversation, much in this style, I left him.

Of course I understood that there was no remaining long in the place after such an outbreak, so I took counsel with my companion, and with an individual whose name is mentioned in the Journal, Khalef Ebn Aisa, our guide. We agreed not to show the white feather, by leaving the town immediately, but to keep quiet, and go on doctoring the people of the second and third ranks of society for the next two or three days, and then secretly to get away. So we remained three days, attracting as little notice as possible, and keeping mainly in-doors. On the third day we took the opportunity of the long evening prayer, when everybody was in the mosque; and having got our camels ready beforehand, we mounted on their backs and left the town; before the prayers were finished we were a good way off, and night was setting in. Other arrangements were made, which enabled us to escape the notice of the King until we were quite beyond the reach of anything like pursuit.

I am afraid I have trespassed too much upon your time. However, I have been requested to say a word about the fire-worshippers, and that form of religion which exists in Arabia. This is an interesting subject, especially in this point of view, viz., that I do not know that anybody has mentioned or stated it in a distinct manner, and I was myself exceedingly surprised by what I saw of it.

The first circumstance I noticed was this. Of course you have all heard—it is a thing which is always said—that the Mohammedan religion, strictly speaking, is only practised in its rigorous forms in the towns and villages; that the Bedouins or nomad Arabs have only the name of Mohammedans, without the practices. Now I found that many of the tribes, before we came to the country where, properly speaking, that form of religion is dominant, still kept up something of the old religious usages which existed in Arabia before the time of Mohammed. This I had not suspected. However, such was the case. I do not know whether any European, except the gentleman whose name was mentioned by the President, Dr. Wallin, who travelled over a part of the same country as myself,—I do not know that any European has ever been precisely into the part of the desert which lies towards the Jäuf and beyond it. However that may be, I can assure you that anybody who should travel there under the appearance of a Mohammedan, or pretending in any way to uphold what would have to do with the Mohammedan religion, would never rightly know what the religious practices of the nomad tribes in that part of

Arabia are,—for this simple reason, that in those countries which are still frontier to the Turkish empire, though not belonging to it, Mohammedanism being the State religion, and being rigorously maintained by the State, nobody of Arab race dares, generally speaking, to profess himself openly of any other creed. Much in the same way, a traveller in Syria itself, meeting with a Druze, or those remarkable sects which abound in that region, would be often told by them that they are Mohammedans, simply in order that they may not get the bad name of being anything else, and because they are afraid of being reported. In the same way the Bedouins or nomad Arabs, who are very timid and cautious, and exceedingly afraid of getting into a scrape, will very often say in a general way, "We are Mohammedans," in order not to compromise themselves with a traveller whom they believe to be a Mohammedan, or more or less a friend of the Turkish Government, which is a Mohammedan Government. In that case, though they would not know how to say Mohammedan prayers, they yet would always call themselves Mohammedans.

Having said this by way of explanation, I was myself fully known in that part of the country as a Christian of Damascus, and as an individual who, as they themselves frequently judged, might have committed some great civil crime at Damascus, and had escaped from the pursuit of Government, in order to take refuge in Arabia. Though such a supposition was not very honourable to my character, I readily allowed it to pass uncontradicted, as the most convenient screen that could be imagined. Consequently, I put no restraint upon them.

The first thing I remarked, and it surprised me very much, was with respect to a great number of these nomad tribes in the north of the central part of Arabia, that their only form of religion was to turn to the sun morning and evening; that is, exactly at the moment that the sun's disc arises, counting from the moment when the first ray appears above the horizon to the moment when the disc is complete, they turned their faces to the sun, and alternately recited certain prayers; repeating the same again when the sun is setting in the evening. Everybody knows that to say prayers at the moment the sun's disc is rising or setting, is strictly forbidden by the Mohammedan religion; the prayers are either said a little before or a little after sunrise and sunset—generally speaking, a little after; because it is supposed, in Mohammedan tradition, that the sun rises and sets between the horns of Eblis, and consequently, whoever prays at that moment is supposed to pray to his Satanic Majesty's horns. Every morning and evening these Arabs said their prayers—not turning their faces to the Caaba at Mecca, which is the point to which the Mohammedans turn, but turning to the sun; and these prayers are addressed by them to some divinity supposed to reside in the sun. I often heard the prayers themselves. I was enabled to write them down. They were simple forms of adoration and of petition, addressed in the name of God towards the sun. I do not say exactly to the sun, but towards the sun.

Another point of religion which they had, and which they talked about very freely to me, as well as among themselves, was the practice of sacrifice at the tombs of their relations; not at the tombs of any supposed saints, or anything of that kind, such as may be found existing in Mohammedan countries, but at the tombs of their nearest relations. These sacrifices were generally annual, commemorative of the death or the individual, and consisting of sheep or camels. The object was to put themselves in communication with the souls or spirits of the dead, a certain Eastern form of spiritualism, and rather barbarous, though not less superstitious than the Western one.

Going on and entering Arabia I found these practices very general. When I got into the kingdom of Shomer or Hal, among the stationary inhabitants, I found the same practices very generally existing in the villages, but not in the principal towns; and they added to it the worship of trees. I was shown one tree which had received honours far above its own nature, especially when rain did not fall. This tree was supposed to answer their

prayers by sending it. Dances were performed round the trunk, and prayers addressed to it that it might procure rain. It was not a palm-tree; it was one of those large thorny trees common in Arabia, and named the "Zulh;" it is a kind of acacia. I was not so much surprised at these forms of religion in themselves as at their being so wide-spread. They are vestiges of the old religion which covered the principal parts of Arabia before the time of Mohammedanism.

When I got further on, after passing through the Wahabite kingdom, where again I found Mohammedanism, and drawing towards the Omàn kingdom, on the Persian Gulf, I once more lit upon the practices of fire-worshipping and of worshipping the sun. They worshipped fire in this manner: they lighted fires upon sacred peaks and mountains, danced round them, and worshipped them. Only in one case did I get permission to be present at the ceremony. I found it was generally practised on the first day of the month, which seemed the day set particularly apart for celebrating these ceremonies. I could not discover in the country any regular priesthood, such as exists in India or in Persia, nor anything of the Persian dualism of the two principles, the Good Principle and the Evil Principle. It seems to me an old form of Sabæanism, the simple worship of the element of fire, whether in itself, or in the sun, or in the planets.

Another thing that I noticed, and it was a very remarkable one, exceedingly surprised me. I have since mentioned it to a very learned and well-known professor at Oxford, and he was unable to give me any explanation of it. I had seen notices in some of the Mahommedan books that the Sabæans when they prayed, turned to the north and not to the sun alone. Now I found these people in the interior of the country very often, not at morning and evening prayers—when they prayed, properly speaking, to the disc of the sun,—but at other times, praying with their faces to the north; and not only that, but they gave the North Star the name which in the Hebrew Bible, in the Book of Exodus, is attributed as the uncommunicable title of God, the well-known name composed of the letters J A H. That name was given by them to the North Star, probably from an idea of its fixity, as being the only fixed point in the heavens, around which the rest of the universe seemed to turn. From that circumstance, they had given it the name of J A H. I only repeat what they say; for God forbid that any one should make anything like an improper allusion to the very name by which God revealed Himself to Moses in sacred history.

This fact, along with its natural explanation from the character of the North Star, and with the practice of their turning to the north, as well as the particularly simple form of fire-worship that exists, made me believe that this is not a new form of religion, but a wreck of the old Sabæan religion, which, as is well-known, overspread almost the whole of Arabia before Mohammed's time; for before his time idolatry, in its grosser form, was confined almost exclusively to the narrow strip near the Red Sea, where certain idols of rough hewn stone were adored, and of which some vestiges are still to be found. But the rest of Arabia practised fire-worship; and thus—though without having sufficient exact critical data to give entire certainty, yet as far as I could judge by other details which are too long and too particular to be entered into at the present moment—I cannot doubt that these are the remains of the old Sabæan religion which had formerly occupied almost the whole of Arabia, and which we see yet exists in the lower part of Central Arabia, as well as in the eastern and southern provinces which form the kingdom of Omàn. The latter is a very rich and beautiful province, the most beautiful part of Arabia I have seen, much resembling the Indian coast, and almost separated from the rest of Arabia by an enormous expanse of desert. Consequently, the Mohammedan influence has been but faintly felt there, and the people have maintained themselves in the old religion. Ethnological considerations may also have had

something to do with it; and these perhaps, may be described on another occasion.

I must here mention the existence in Arabia of those circular ranges of huge stones, well known in some parts of England and Brittany, of which Stonehenge is a familiar example. Of such I met with one in the Kasim near the town of Rass; two enormous blocks, set on end, supported a third, so high that I passed under it on my camel's back; some blocks have a transverse mass across their top, others stand alone, many lie scattered in the valley. Those yet upright form the segment of a circle; their average height is about 12 to 14 feet. On my inquiry if similar ruins existed elsewhere, I was told of two others at some distance, but in the same province. The Arabs considered them as belonging to the ancient and gigantic races whom they believe to have once occupied the land; but could give no approximative date. Similar vestiges might, I feel sure, be discovered in the interior of Oman, and other southern provinces.

Sir HENRY RAWLINSON said at so late an hour he should not attempt to detain the Meeting with any lengthened observations; but merely in a few words add his testimony to that of Sir Roderick Murchison as to the extraordinary merits of the address they had just heard. It contained an immense amount of entirely new matter to himself, and was as interesting as anything he had ever heard in that room. His own experience of Arabia was confined mainly to the upper desert during a residence of twelve years at Bagdad. He had come into contact with a great number of Bedouin chiefs from Jebel Shomer and other parts of Arabia; and he could bear witness to the minute accuracy of many of the facts which Mr. Palgrave had mentioned respecting them. Although it was not generally known, yet there had been previous instances of gentlemen travelling across Arabia. The first instance he knew was that of Captain Sadleir, who crossed from Katif, by Medina, to Jiddah. According to the tradition of the Arab chiefs in the north, he passed through absolutely as a bale of goods. He was consigned at Katif to the agent at Jiddah, and was passed from one chief to the other, labelled and receipted; and in that way he reached the opposite coast—as they might suppose with no very great advantage to science or geography. On another occasion three medical gentlemen came with Khurshid Pasha in 1838 and 1839. They crossed the whole peninsula also; but they were merely with the army, and had not the advantage of coming in contact with the chiefs of the Bedouin tribes as Mr. Palgrave had. So that Mr. Palgrave might really lay claim to being the first traveller who had utilised his travels in Arabia. The practice of sun-worship was well-known to him. It existed in all parts, not only in the deserts of Arabia, but up to the Sinjars and Mardin hills. With regard to the other point, the worship of fire, he did not think that was a genuine Arab custom. He believed the people on the coast of Oman must have imbibed fire-worship from the opposite coast. The Persians, when they were overcome by the Mohammedans retreated, some of them to India; others to inaccessible places in the deserts where they could find refuge; and some, probably, to those precipitous rocks along the coast of Arabia from Muscat to Shohar. He could not think it was an Arab custom. The Sabæans of Arabia were not at all the same as the Mohammedan Sabæans. The people, that is, described by the Mohammedans as Sabæans, had nothing to do with the old Sabæans of Arabia; they were merely a remnant of the ancient Assyrian population, whose head-quarters were at Harran. Mr. Palgrave had also spoken of idolatry; the Arab books were full of accounts of idolatry in different parts of the country, and the Hinyaritic Inscriptions testified to a general idolatry along the southern coast of Arabia. There was only one other point he should like to mention; it was in reference to the Arabian horse. He felt some interest in the subject, because he had brought home, and had still in his stable, what he considered and what was considered in the country a pure specimen of the El Nejed breed.

Mr. PALGRAVE: From whom did you get it?

Sir H. RAWLINSON said he brought it from Bagdad. It was a present. It might not belong to the chief breed, but it certainly is a Nejed horse. It is not one of those beautiful white creatures that Mr. Palgrave mentioned; but it is a bay, which appears to be a colour taboo in the chief's stable.

Mr. PALGRAVE: I saw none there.

Sir H. RAWLINSON remarked, the Nejed was an enormous province containing a third of Arabia, and of course there must be horses of different breeds. There may be different breeds of the Nejed, the same as there are of other breeds; and some of the horses that have come from Nejed are bay. He was particularly struck with Mr. Palgrave's description of the chief's stable, the merits of which he had often heard mentioned. He could only reiterate what Sir Roderick Murchison had said, that Mr. Palgrave's address was about as important and interesting as any he had ever heard in that room.

The PRESIDENT formally conveyed the thanks of the Society to Mr. Palgrave for his communications, which that gentleman briefly and appropriately acknowledged.

In adjourning the Meeting to the 14th March, the PRESIDENT felt himself bound to remark, that the extraordinary adventures of Mr. Palgrave, coupled as they were with such striking sketches of the inner life of these primitive Mohammedans, the Wahabites, fully entitled him, the President, to declare that, whilst this narrative had conveyed to the meeting much valuable knowledge, it had at the same time produced such a deep interest in all who were present, that it might be also set down as the Thousand and Second of the Arabian Nights' Entertainments.

[For further particulars relating to the subject of Mr. Palgrave's paper, see Rev. G. P. Badger's letter, and Mr. Palgrave's reply thereto, in "Additional Notices," pp. 97-105.]

Eighth Meeting, March 14, 1864.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Sir Frederick Halliday; Lord Gilbert Kennedy; the Hon. C. H. Tracey.*

ELECTIONS.—*Capt. J. P. Basevi, R.E.; Edward Blore, Esq., F.R.S.; George Gladstone, Esq.; Major W. Goodenough, R.A.; Charles Lambert, Esq.; Rev. J. H. Marsden; Alfred Parish, and George Ridley, Esqrs.*

ACCESSIONS TO LIBRARY.—'Eight Years in Asia and Africa, from 1846 to 1855,' and 'Three Years in America,' by J. J. Benjamin. 'A Compendium of Mathematical Geography,' by A. H. Dick, M.A. 'The Naturalist on the Amazons,' by Henry W. Bates. Stevenson's 'South America.' Continuation of 'Transactions,' &c.

ACCESSIONS TO MAP-ROOM since last Meeting (Feb. 22).—New Zealand—Map of the Neighbourhood of the Waikato River. Sketch of the Ground at Rangiriri, showing the action of Nov. 20, 1863. Denmark—Island of Alsen, lithographed at the War Office, and presented through Sir E. Lugard. India—Chart of Bombay Harbour, and Report on the better Lighting of the Port; by Captain W. C. Barker. France—Plan of the Military Operations at Bayonne.

in 1814, on rollers; presented by Sir R. I. Murchison. Atlas by H. Moll, on 62 sheets; presented by S. M. Drach, Esq. World, on Mercator's projection (printed in colours by Berghaus and Stülpnagel); by purchase. Atlas—Fortified Towns of Europe, on 25 sheets, 1565; by purchase. Africa—Five Views, coloured, of Free Town, Sierra Leone (Ackerman); by purchase. Atlas—Zur Industrie und Handelsgeographie, 3 sheets; by Drs. Klein and Lange. Netherlands—10 sheets of the Topographical Atlas; presented by Chev. T. Swart, H.C.M.R.G.S. Continuation of the Ordnance Survey Maps.

EXHIBITIONS.—Three larger-sized Photographs to illustrate Lieut. Palmer's Paper, viz.:—Town of Victoria, Vancouver Island; Treasury and Assay Offices, New Westminster, British Columbia; Holy Trinity Church, New Westminster, British Columbia.

The first Paper read was—

"Vancouver Island; its Physical Geography, Climate, and Mineral Resources." By Dr. C. FORBES, R.N.

AFTER noticing the contradictory statements current as to our Pacific colonies in North America, the Paper described the abrupt character of the seaboard scenery of Vancouver, alternating with numerous fiord-like harbours, that had been worn in the metamorphic and trap rocks which form the basis of the island. The inland or north-eastern shore, on the other hand, is more undulating, attesting the existence of sedimentary rocks, chiefly carboniferous sandstone with occasional belts of limestone. The face of the country is almost uniformly covered with dense forest; but tracts of grass-land are occasionally met with, and lovely lakes and tarns abound. The very irregular configuration of the coast precludes the possibility of a navigable river being found anywhere throughout the island; what streams there are being usually winter-torrents, dry in summer, but with a little management capable of supplying water-power throughout the year—possibly to be utilised in the future for much-needed irrigation of many portions. Owing to the clay-subsoil, there are numerous springs "of excellent water."

After glancing at the geological structure of the island, the main feature of which is that it is occupied throughout almost its whole length by a backbone of trap, the author pointedly calls attention to certain strongly-marked features of glacial action, where ice-drift has scooped out the hard trap-rock, and deposited enormous areas of trap and granitic boulders, chiefly at the south-eastern

extremity of the island. These and their localized cognates furnish excellent building material in unlimited quantities.

The soils are:—1. Coarse gravel, bearing fine timber. 2. A calcareous loam of good quality, producing excellent crops of vegetables, and suitable for clover. 3. A rich dark-brown *humus*, which only requires subsoil drainage to produce the very heaviest crops of wheat and cereals.

As to hydrography, Dr. Forbes cited as exhaustive the admirable 'Sailing Directions' of Captain Richards, the present Hydrographer to the Admiralty, who has dwelt at great length upon the tidal irregularities of the sound separating Vancouver from the mainland. The author then invited attention to the very low temperature throughout the year of this portion of the Pacific, owing to the prevalence of Arctic-currents, and the numerous rivers fed by molten snows that debouch into it; its boreal character being indicated by the presence of numerous marine-shells, hitherto supposed to be confined to the Arctic zone. Along the western shore extends a chain of banks, stocked with abundance of excellent fish.

The climate of Vancouver Island in its general thermal conditions somewhat resembles that of England; but is modified by the low temperature of the ocean and the snowy mountain-chains, while even to the south-east the Olympus Range of Washington (U.S.) Territory, which run east and west, presents to the colony a northern aspect usually covered with snow. The result is that, till as late as Midsummer-day, there is a bright clear atmosphere with cold winds. The winter-frosts are occasionally very severe, but, as a rule, what is called an open winter is the characteristic of Vancouver—somewhat resembling that of the West of England. In summer the winds are usually south-west and north-west, and more rarely north; the latter hot and dry, owing to their having traversed the parched and heated soil. The autumn is of greater duration than that of Europe, in consequence of the Indian summer prolonging it. In brief there are two seasons, passably marked, a dry and wet, the heaviest rainfall invariably occurring at night. The whole surface may be roughly estimated at 12,000,000 acres (about four times the area of Yorkshire), of which only 1,000,000 are available for the stock-breeder and agriculturist. The most important position commercially and strategically is in Tooke district, abutting on San Juan de Fuca Straits, where the employment of a few steam-tugs would greatly facilitate the approach to one of the most commodious land-locked harbours on the entire coast.

Another available harbour which can be entered at all times, and possesses excellent holding ground, is Esquimalt Bay, which is

admirably situated to form the head-quarters of the Royal Naval force in the Pacific.

After describing Victoria, the present capital, and its harbour, which—being only accessible for large vessels at or near high-water, while the anchorage outside is unsafe—makes the site of the capital anything but well-chosen, the author records his opinion in favour of a short canal being constructed to connect it with Esquimalt Harbour already described.

The Paper then glanced at the attempts that have been made to open up a new route by the Sound, and up some of the numerous lateral fiords, to the Gold District, instead of the present difficult route up the Fraser. One of these is by Bentinck Arm, the other by Bute Inlet; but the officer detached reported unfavourably against both, though admitting that, being pressed for time, he had scant opportunity for examining whether a more available route might not exist. Should either of these be opened, Nanaimo, situate on a land-locked bay of the Gulf of Georgia, would become the great centre of business. The carboniferous deposit here has been proved by boring to extend to the depth of at least 84 feet, in which two thin seams of coal were passed through; and a good vein of copper has been struck, and is being worked. As, moreover, this point commands both these routes, it will become a great commercial station, whence steam-lines would radiate to the Russian settlements, and all the principal settlements of the Colony, as they could coal here at the pit-mouth. One single seam irregularly worked by the Hudson's Bay Company, with their scanty staff, has yielded 63,154 tons, valued at 8 dollars per ton, or 101,046 $\frac{1}{2}$. The price is now 6 dollars at the pit-mouth, but a far larger quantity is being raised of late; 22,000 tons the first year, chiefly for San Francisco; and vessels of large size (one of 1500 tons) now frequent a harbour, where, except Her Majesty's ships, a few small trading-schooners were once the largest craft. The coal is hard and lustrous. This seam, which has been most favourably reported on by analytical geologists and practical men, is 3 ft. 10 in. thick, and has been found over an area which, supposing it preserves the same average, implies a supply of at least 1,000,000 tons. Beneath there are a 5 ft. seam and a 2 ft. 6 in. seam, the uppermost being found at a depth of 60 fathoms. Another carboniferous seam, possibly the same as that of Nanaimo, occurs at the extreme north-west point of the island, where Johnson's Straits, full of excellent anchorage for steamers, lose themselves in the Pacific; the country immediately to the south being a kind of prairie-land, little explored, and very imperfectly surveyed. The strata of coal lie here horizontally.

Somewhat similar features occur at intervals along even the precipitous west coast, where a Company is working another seam of coal.

Clayoquot Sound differs from all others in being beset at its entrance by banks and shoals, and has a sandy bottom instead of the usual mud. Barclay Sound is studded with islands affording good anchorage. At the upper end is a remarkable cleft, known as Alberni Canal, giving passage to the outlet of a chain of lakes, on a level plateau; on the opposite descent from which lies at a short distance, Nanaimo, already mentioned. At Alberni about 15,000,000 superficial feet of Douglas pine and other excellent planking, besides vast numbers of ships' spars, are turned out here by one firm alone (a London one), which has the honour of opening up to commerce the splendid timber of the region. To give an idea of the amount of the timber-trade here, it may suffice to state that in the first nine months of 1863, no fewer than 13,500 tons of shipping cleared hence with timber; the Americans claiming 7280. The markets were widely scattered; Europe, China, Manilla, and Chili being among those enumerated, besides the ordinary local demand. Ship-building, fish-curing, furs, oil, &c., constitute the staple branches of commerce from Barclay Sound.

Agriculture usually follows the same four-course rotation as in England, and the green crops are almost identical. The wheat averages 25 to 30 bushels to the acre.

There is ample employment for the rod and gun, and the hunter (as distinguished from the sportsman) will find in the forest plenty of opportunity for proving his prowess upon the puma, the bear, and the wolf, besides elk and various kinds of deer. The salmon here will not, according to Dr. Forbes, rise to the fly.

The Paper concluded by emphatically disclaiming that mere farming could for many years to come be regarded as a money-making speculation; but *tilling the soil himself*, the agriculturist might surround himself with every comfort, exchanging his dairy-produce and fruit against imported articles. The author, above all, cautioned the lower classes at home from emigrating in the hope of finding at any of the gold-fields what are called "Poor Men's diggings." That business has passed into the hands of a class possessing large capital; and, as a general summary, it may be broadly stated that the prospects of Vancouver are *prospective*—to be reaped by the first suitable emigrants and capitalists who can develop its resources.

The PRESIDENT remarked, that on many occasions we had had communications from medical men attached to our naval squadrons; but, during his connection with the Society, he recollected no occasion on which a Paper more replete with knowledge upon various branches of science had been pre-

sented than this of Dr. Forbes. He might have fancied that he was presiding at the Geological Society, so admirable were the observations of Dr. Forbes upon the geology and structure of Vancouver Island. Whether it respected the geology, the meteorology, the botany, or the statistics of that island, all these were so well combined in this Paper, that he had much pleasure in calling upon the Meeting to return thanks to Dr. Forbes for his valuable communication. He should not request any gentleman to address the Meeting until after the next Paper had been read, as the two subjects were intimately connected; and then he would first call upon Captain Richards, under whose orders Dr. Forbes had obtained his knowledge, and who had himself made an admirable survey of Vancouver Island.

The second Paper treated of—

The Geography of British Columbia and the Condition of the Cariboo Gold District. By Lieut. H. S. PALMER, R.E.

LIEUT. PALMER mentioned that since the first discovery of gold in British Columbia in 1858, fresh deposits had gradually been traced farther and farther northward, till ultimately the well-known fields of Cariboo had been reached, 500 miles from the mouth of the Fraser. Entrusted with the task of a general survey, he details the geographical outline of the colony, the seaboard of which extends 500 miles, protected throughout almost its entire length by Vancouver and Queen Charlotte islands. This seaboard is indented in the most extraordinary manner by deep bays and arms of the sea, presenting an extent of sheltered inland navigation, and an actual length of shore-line, such as are nowhere equalled on any similar stretch of coast in the world.

The most marked physical feature of the country, viewing it from the shore inland, is the parallelism of two mountain ranges with an elevated intervening plateau of rolling country 100 miles in breadth. The coast-line of mountains is known as the Cascade or Coast range, 120 miles wide, the western slopes of which are covered with the most magnificent forest. Its sea-front is everywhere bluff and abrupt and quite close to the shore, except where the Fraser falls into the San Juan Fuca Sound, when it recedes some 40 miles. The eastern side of the range is drier, the trees more scattered, and the general profile less abrupt. The principal crest of this chain is about 5000 feet above the sea, a peculiar characteristic being the almost entire absence of peaks. The rivers on the east side are naturally longer and less impetuous than those on the west, but occasionally some of them rise on the plateau, and thread the mountains till they fall into the sounds. Above some of these, glaciers are said to have been seen; but nothing authentic seems to be known on this subject.

The scenery of the table-land, which is well suited for pastoral purposes, is described in high terms; the rivers having occasionally hollowed out for themselves channels of immense depth, in which occur splendid cascades, some of which are mere fissures, others are met with in broad-terraced valleys, or in vales of gently undulating slopes, covered with grass and picturesquely dotted with yellow pines. Here and there are pretty sheets of water, which, like the rivers, are well supplied with numerous kinds of fresh-water fish. Above 3000 feet, the grass, which gradually gets less nutritive with the increased elevation, gives place to a universal mantle of dwarf fir. Here farming has proved moderately successful at an elevation of 2100 feet, but Lieut. Palmer doubts whether a considerable time must not elapse ere enough grain can be raised in the more sheltered and well-irrigated valleys, to admit of its finding a market at the mines or settlements. At present the insects are a severe annoyance to man and beast, but these will probably recede before man. The west side of the Fraser is rather more elevated and the rivers are fewer, but the east side is the most pleasant and desirable part of the colony.

Just beyond begins the second mountainous range, which extends without a break to the watershed of the Rocky Mountains, which as far north as the Peace River, flowing eastward, forms the eastern boundary of the colony on this side. The only portion of this unexplored region where white men are to be met, is Cariboo.

The Fraser, which drains one-half the entire territory, has frequent stretches free from rapids, where steamers of small draught can run; while from Fort Alexander down to New Westminster there is now excellent communication, passing through the most sublime scenery. A marked characteristic of the Fraser, in which it differs from every other river, is that there is no lake throughout its course; the flow of water is rapid, and the waters consequently dark and muddy. Another peculiarity, in which it resembles the Mississippi, is that the frequent accession of considerable volumes of water from large tributaries does not perceptibly increase its width till it approaches its mouth.

Cariboo lies in the elbow formed by the upper waters of the Fraser, and is bounded on the south by the Quesnelle River. A marked phenomenon is the confused congeries of hills of considerable altitude, from 6000 to 7000 feet high, thickly timbered, whence subordinate ranges radiate as centres. Each valley thus formed is the bed of a stream of more or less proportions, from the tiniest, called "gulches" by the miners, which may be jumped over, to respectable-sized rivers. All these have long since been "pro-

spected," every creek having been discovered to be more or less the site of the richest deposits of gold. A circle of three miles radius from the top of Bald Mountain contains five creeks, two of which are the most notorious gold-beds in the colony. Snowshoe Mountain contains the headwaters of no fewer than six of these within a similar area, the streams in every case radiating to every point of the periphery. The views from the summits of these mountains are described as splendid.

After adverting to the prospects and past history of the diggings, the unfavourable accounts of which, and of the colony, he, like Dr. Forbes, traced to their true source in ignorance of physical geography and most unjustifiably sanguine expectations, the author reverts to the phenomena above noticed; whence he draws the conclusion that these mountains have supplied the gold, and that they are so many *foci*, as it were, of the precious deposit. If this be true, he concludes that, even as it stands, Cariboo will be found the richest and most inexhaustible gold-field on the globe. He then remarks a curious fact, that the intrinsic value of the gold washed out of the creeks varies greatly within a very few miles; the difference amounting in some instances to as much as 8s. per ounce.

A succession of auriferous deposits have been traced, following the general trend of the main chain of mountains extending from the southern boundary of the colony to the Peace River, *i. e.* over 7° of latitude, while the extremities so far as ascertained lie between the meridians of 119° and 122° w.

The winter of Cariboo appears to be much more severe and prolonged than that of the coast or Vancouver Island, and will much retard the development of the mines, which are accordingly during that season "laid over," as it is termed—*i. e.* the laws enforcing the mode of working them, &c., are remitted for the time. The thermometer sometimes falls to — 35° c. (31° below zero of Fahr.), when of course nothing but underground claims can be worked. The thaw, which commences about April, renders Cariboo for a season anything but an enviable residence, owing to the rains and the steaming mists, while locomotion is all but impossible. In past years the trail at this season was loathsome from the numbers of horses that lay unburied after succumbing to the tremendous toil of conveying the first convoys of provisions.

Although for ten or eleven months in the year the country has a gloomy, cheerless aspect, August and September being the only bright exceptions, it is remarkably healthy. The sun is late of making his appearance, even in midsummer, owing to the hills enclosing the diggings on every side.

Of late 400 miles of excellent waggon-roads lead from Yale, the present head of steam-navigation, so that the entire distance from New Westminster to Cariboo can now be accomplished in from six to seven days. At the estuary of the Fraser, the author, in summing up, said that the winters somewhat resembled those of England, though the extremes were greater; and that the rainfall there is about 54 inches annually.

The PRESIDENT was glad Lieutenant Palmer had prefaced his account of the Cariboo Mines with a description of the physical geography of the whole region. It was as clear an account in a small compass as he had ever heard given. The writer having alluded to himself, when speaking of the radiation of the gold-streams from the Bald Mountains, he had one observation to make. He hoped no gentleman would go away with the idea that gold *in situ* radiated after that fashion. These, as the author had explained, were only the streams that carried down the gold from the auriferous mountains in which it had been originally imbedded. The line which the gold-veins in the slaty rocks took, as laid down on the map by Lieutenant Palmer, was on the whole from North to South. Such too was the general line in the auriferous veins in Victoria, as delineated in the excellent maps of Mr. Selwyn; and the same remarkable fact occurred in the great continent of America. The great object of the two Papers was to put before the British public the truth respecting the gold-fields, the climate, the minerals, and the advantages and disadvantages of these regions. He was informed by Lieutenant Palmer that not more than one-third of the population of British Columbia was truly composed of British people; consequently, the Americans, who were very active miners, were putting a considerable portion of the gold into their own pockets, while our countrymen at home were not aware of the resources which awaited them there. In calling upon Captain Richards to speak to the merits of the first Paper, he took the opportunity of congratulating the Society upon the accession of so distinguished a naval surveyor as Captain Richards to the post of Hydrographer to the Admiralty, which had been so ably filled by the lamented Admiral Washington.

CAPTAIN RICHARDS, R.N., said he was happy to bear testimony to Dr. Forbes's Paper as conveying a very truthful idea of the country, and as affording a fair and not overdrawn picture of the prospects of intending emigrants to these colonies. Dr. Forbes was a distinguished geologist, and an accomplished general observer, and he had not failed in his endeavour to communicate to others the information he had gained during his long service in various parts of the world. He (Captain Richards) would particularly recommend the perusal of Dr. Forbes' Prize Essay on Vancouver Island to those who took an interest in that important colony; and he begged to add that it was with much pleasure and gratification he had listened to the high and well-deserved compliment paid to Dr. Forbes by their distinguished President.

After the Paper just read, it would be unnecessary for him to take up the time of the Meeting by any lengthened remarks on Vancouver Island, although, from having passed many years of his life in the exploration of its shores, he naturally felt much at home on the subject. It was evident that it was not destined to become a great agricultural country, though there were highly favoured spots of considerable extent which held out great encouragement to the farmer, and many of these were still unoccupied. But it was already a great commercial country, and daily increasing in importance. The rise of the British colonies in the North Pacific had not been, perhaps, so rapid, nor their resources

so speedily developed as those of the neighbouring countries to the southward; still their progress had been rapid, steady, and was secure beyond a doubt. Vancouver Island was most important in a geographical point of view, and its value to Great Britain could not be overrated. It was the head-quarters of the naval power of England in the Pacific, and was already a great coal and timber producing country. It was not too much to say that its spars were the finest in the world, and, though it might not be generally known, were now supplied to most of the naval powers of Europe. The fisheries also in due course of time would prove a source of great wealth to the colony. They had long been known, and now that the survey of the sea-coast had been completed, and the seaman knew where he could run for safety and shelter, they would soon become developed.

As regards the sister colony of British Columbia, no one was better qualified to speak than his friend, Colonel Moody, of the Royal Engineers. He (Captain Richards) was well acquainted with its coasts, and many of the advantages possessed by Vancouver Island equally belonged to British Columbia. Some little rivalry, perhaps jealousy, naturally existed between two colonies in such close proximity to each other; the one with a free port, the other dependent at present principally on its import duties for its revenue. But these would soon vanish. In his opinion, the two colonies would be mutually dependent on each other for their prosperity. British Columbia possessed a magnificent river, the Fraser, affording water-communication for 100 miles into the interior, with roads diverging to the different gold and agricultural regions, and which at no distant date would connect it with Canada. The tranquil character of this river, and its entire freedom from those dangers to which navigators on this coast are subject, is entirely due to the position of Vancouver Island, so that a debt of gratitude is due to the smaller, though elder sister, on this account alone. He repeated that there should be no jealousy between the two colonies. Though mutually necessary to each other, their interests were widely different. British Columbia was a rich gold-bearing and extensive agricultural region, and would soon be second to no colony of Great Britain; while Vancouver Island, from its admirable geographical position, must always be the great entrepôt of commerce, and was already a powerful rival of that great emporium of the Western world—San Francisco.

The President, in announcing that Colonel Moody, of the Royal Engineers, under whom Lieutenant Palmer served, and who had occupied a high station in the region under review, was present, said, he hoped that a person so intimately acquainted with the country would favour them with his views on the subject of British Columbia, and its value as a colony.

Colonel Moody said, in reference to the last observation of Captain Richards respecting the two colonies, that there was not the slightest local feeling in the matter. Captain Richards was a most disinterested person, and nobody had done more than he to keep down any feeling of rivalry between Vancouver Island and British Columbia. There were one or two points in Dr. Forbes's Paper which he should like to remark upon. One was with reference to the terminus of the railway, which, no doubt, would come one of these days. Dr. Forbes spoke, not too strongly, of the importance of and the future of Nanaimo. It was destined to be a Newcastle, a Glasgow, a Birmingham, and a Swansea, all in one: it would be an important place for manufactures. It was the seat of the coal, and it was where all the ores that abounded along the coast both of Vancouver Island and British Columbia would be brought. It would be the most important manufacturing town in the North Pacific. With regard to Victoria and Esquimalt, their future was entirely commercial. Touching the point for the railway terminus, it appeared that there were three chief points known at present: Bentinck Arm, to the north; then, Bute Inlet; and then, the mouth of the Fraser River. There were other inlets and gulfs which pierced the mountain ranges, and some of these might

afford opportunities for penetrating into the interior. For a railway terminus, however, Bute Inlet presented great difficulties. No doubt a good road would be made there some day; but he thought the terminus of railway communication would be, not at Bute Inlet, but at the mouth of the Fraser. There was really no other good line of country through which a railway could be carried, and from the reports he had received, and from what he had seen, he was happy to believe there were no physical difficulties which our engineers could not overcome in carrying a line of railway over the Rocky Mountains down to that part of the coast. Another point was—and as a soldier they would forgive him if his ears pricked up at hearing it—that the island of San Juan was not of military importance. It would be of military importance if it were fortified. If the Americans held possession of it, and left it as it was, it would be of no moment; but, if they should fortify it, they might make it a serious difficulty to us, for it would enable them to a great extent to command the passage to the mainland. He regretted to see the expression “the disputed island of San Juan” slipping into the newspapers both in England and America; for it was not that island alone, but the whole archipelago that was involved in the question. With regard to the pine-forests, there were very valuable pines on the coast of British Columbia and in the interior. The value of the timber could scarcely be exaggerated; great quantities would be sent to China, and much might be brought home. The size of the trees was extraordinary. He had measured numbers, and he made out that the average of the Douglas pine ranged somewhat over 300 feet in height. One or two measured 320 feet to where the top branches had been broken and splintered off by the trees falling; and where he left off measuring, the tree was as thick round as his waist. Settlers looked upon these trees with abhorrence, because of the difficulty of clearing the ground which they entailed; but the day would come when the trees would find their market value. On one occasion he was out riding with Governor Douglas, and they came upon the ruins of a great cedar-tree. Governor Douglas got off his horse, and, with a 3-foot rule, he measured the trunk about 5 feet 6 inches above the ground; and, although the bark had been burnt off, the tree measured 57 feet in circumference. This would give some idea of the vastness of these trees. According to an article in the ‘Gardener’s Chronicle,’ based upon the meteorological journals kept in their camp, the climate round New Westminster might be compared with that of Chiswick; a greater quantity of rain fell, but there were not more rainy days; and the general character of the climate was as near as possible like that of Chiswick. Occasionally the winters were severe. The winter he was there was such a winter as we occasionally have in England when the Thames is frozen over. It is a thorough grain-ripening country. The farmer would rejoice in it, because almost every year he would be safe in getting in his hay and wheat crops. The seasons are well and clearly marked. There is no jump from winter to summer, as there is in Canada; but a regular winter, spring, summer, and autumn. There is a great deal of rain in the latter part of the year, and some fog in the winter. There is an absence of east wind, and, on the whole, it is a climate most suitable for a Briton. The healthiness of the country is something remarkable. These observations referred to the neighbourhood of New Westminster. British Columbia consisted chiefly of plateaux of different degrees of elevation; accordingly, there were many varieties of climate. Beyond the Cascade Range you get quite a different description of climate, where there is very little rain, and where it is very hot; the thermometer ranging to 90° and 95°, and sometimes to 100° in the shade. A certain description of *cacti* flourished there; rattlesnakes were found among the rocks, grapes ripened fully, and grain was winnowed in the open air. Though the winters are cold, cattle and sheep seem to thrive there; and, as there is not much wind, the sensation of cold is not felt. The bunch-grass rises above the average depth of snow, so that cattle can feed out of doors in the winter. It is

a common thing for the Indians and the packers, who take goods up to Cariboo, to send their horses to graze here in the winter, though the climate is much colder than it is in New Westminster. The character of the plateaux is very remarkable; they range from 2,000 to 3,000 feet high above one another, and when you are upon them, you are not conscious that you are upon mountain land. Another remarkable feature is that the principal valleys and the secondary valleys crossing them are rhomboidal, and the western escarpments are upheaved, so that they slope slightly to the east and upwards to the north. Thus they are placed *en échelon*, like columns of troops; they are not in a continuous series, but, in this *en échelon* form, ascending upwards.

There was another striking peculiarity which distinguished British Columbia from Vancouver Island. In Vancouver Island there is a great deal of rich black mould lying on a stiff clay; in British Columbia the general character of the soil is a light sandy loam. In summer time it is quite light; in winter you are conscious of a greasy feel, your feet slip in it. It is more like a barley soil in England than anything else. Under the application of the most ordinary operations of industry, with irrigation, the soil springs into the utmost fertility immediately, and the yield is abundant. Another singular feature is, that there is a line of soil running obliquely across the country in a north-easterly and south-westerly direction. On one side of that line you have the bunch-grass and the *Pinus ponderosa*, while on the other side of the line you have neither the one nor the other. This line follows the rhomboidal arrangement of the valleys that he had alluded to; and it is so remarkable that he requested his officers to note it whenever they came across it, and their reports showed that the line was as straight as possible. With respect to the future of the two colonies, he would take the opportunity of saying that the advance of one contributed to the advance of the other. Vancouver Island depended entirely upon maintaining its free port; it was adapted eminently to be the great commercial depôt of the North Pacific, and it could only be that for many years to come by maintaining its free ports. In like manner from the circumstance of Nanaimo being so well supplied with coal, and possessing a harbour so easily accessible, it, too, was destined to be a great manufacturing place. He considered Nanaimo the manufacturing capital, and Victoria the commercial capital of Vancouver Island. Vancouver Island could do with a very small revenue. British Columbia, on the other hand, required a large revenue, on account of the great public works that were required. She intended to carry out these works herself, but at present she required a loan from the old country, which no doubt would be repaid. The great works at present carried out had been achieved by Americans and Canadians. The contractors, who were Americans, borrowed the money in San Francisco. The Americans were eminently a pushing race, and he would take this opportunity of saying that the Americans were among the best subjects of Her Majesty in British Columbia. He for one should be very sorry, indeed, were they to withdraw. He believed that a great deal of the gold got out by the Americans was permanently invested in British Columbia, and that it was the intention of the Americans to become permanent residents there with their children. All that the country needs is greater confidence in her at home, and a more liberal, yet judicious, laying out of capital to develop her resources.

Lieutenant PALMER, having been asked by the President to narrate his experience among the natives, said, many reports had appeared in print as to the natives being murderous, yelling savages; but he could assert that such reports were mostly untrue. It could not be denied that sometimes the natives, exasperated by interference with their lands, their customs, and superstitions, had committed dreadful crimes; but they had become debased and degraded by the vices which they had learned from the white man. They were not by nature a blood-shedding people. He had travelled all through the

country, and he only once met with interference from them. When near the coast he gave unintentional offence to the natives with regard to their rights about the salmon. They became so troublesome that he had to expel two or three of them from the camp. He had no sooner done so than twenty or thirty who were sitting round rushed off to their lodges, and returned with an extraordinary collection of old fire-arms, all loaded and primed, and pointed at him. Knowing the character of the natives, he thought the best way was to approach them unarmed. They did not take their arms down, but they consented to enter into an argument, and then he felt sure he should soon persuade them that they were wrong. He succeeded in this; peace was declared, and he had to shake hands with the whole tribe, squaws and all. They became friends, and the leader of the tribe became a great friend of his, and was of great assistance in guiding him through the country. Before the termination of the ride, they were so pleased with him that they used their best endeavours to get him and his companions married into the tribe. As a general rule they respected "King George men." "King George" was the name in which in olden times the Hudson Bay Company impressed upon them the existence of a great white chief, George III., and since then the natives have ever recognised the British people as King George men. He found that by calling himself a King George man, or wearing a bit of King George lace, or saying that he was a friend of King George, he got them to assist him. They were a very harmless race, and he believed in a few years they might be improved, and made a peaceful people. At present they were still degraded. As faithful guides through the forest, and untiring bushmen, they were worthy of a great deal of our admiration.

The PRESIDENT, in conclusion, congratulated the Society upon the great amount of useful knowledge which had been elicited respecting British Columbia and Vancouver Island, and adjourned the Meeting to the 11th of April.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1.—*Extracts from Correspondence between M. ROHLFS GÉRARD and the Council.*

- I. *Translation of Extract from a Letter addressed to Sir Roderick J. Murchison, President of the Royal Geographical Society, from M. ROHLFS GÉRARD, dated Oran (Algeria), 18th December, 1863, requesting pecuniary aid for a proposed journey from Morocco to Timbuctu.*

"Oran, 18th December, 1863.

"On my return from a tour in the direction of Morocco and the deserts of that empire, of which I traversed the provinces of Sus, Oued-Draa, the Tafilelt, Ertib, and Figuig, an account of which series of travels has been published by Dr. Petermann on one hand, besides being reproduced by M. Berbrugger,* editor of 'La Revue Africaine,' which appears at Algiers, I am at present preparing to start once more for the interior; and having, on what I may call my preparatory travels, obtained the necessary acquaintance with the manners and customs of the natives, I look forward to penetrating as far as Timbuctu.

* Now Honorary Corresponding Member, Royal Geographical Society.

"Having received from the Senate of the Hanseatic City of Bremen, my native city, a sum of 1200 francs (48l.), and unfortunately not possessing a similar sum myself, it seemed to me that you, better than any man, could appreciate the difficulties which must harass my progress with means so very limited. For this reason I have ventured to make application to the Royal Geographical Society for a little assistance in money. As my own Government has left me quite at liberty to lay out my own plan of travel, I shall for my part conform myself scrupulously to carrying out whatever instructions you may honour me with.

"As to personal reference, either the Senate of Bremen or Dr. Petermann will supply all necessary information.

"(Signed) ROHLFS GÉRARD."

II. A communication dated 15th January (not necessary to reproduce here) reached M. Rohlfs Gérard, informing him that the Council were debating as to the route he should follow, subject, of course, to all or any emergencies of travel which might compel him to deviate therefrom; and to this M. Gérard replies in a letter of the 24th January,—

III. *Extracts of which we now proceed to translate:—*

"Oran, 24th January, 1863.

"I had intended at first to set out direct from here—in other words from the oasis of the Algerian desert; but the Expedition recently equipped (however peaceable its intentions) for reaching Wargla and el Gôla has reawakened such hatred and mistrust of the people inhabiting the oases of Gourara, Towat, and Tidikelt against all Europeans—especially against all who approach from the French side—that it would be but labour lost to endeavour to penetrate thither. I should be exposing myself at the very least to meeting the same fate as MM. Colomb, Coloinen, and Burine.

"I have therefore permanently decided on going *via* Morocco, which will be so far, that I shall find there persons who will assist me in holding in check the Oued-Draa, and with whom, in my way up, I renewed the ties of hospitality of other days. I shall therefore leave Oran by sea for Tangier; thence by Ouegan for Fez, leaving which city I shall fall in with the Oued-Fez, whose source cannot be far from Djebel Marisan. I shall then cross Djebel Trit-el-Abhari; and thence follow the river through the oases of Mdora, Ertib, and Tafilet; I can then follow the route to follow; because the caravans of the latter-named oasis proceed to unite with that which passes down the Oued-Draa, near the Sanio Nasria, and follows the road by which M. René Caillé returned in 1828. On the other hand, I might rejoin the caravan from Gourara and Tawat, which starts from Ain-Salah; but this is the route on which Major Laing was killed. As for myself, I prefer the latter, if practicable: on the one hand, that I should enjoy thereby the best chance of exploring the oases of Gourara, Tidikelt, Timmini, and Tawat (for when I approach these from the side of Morocco, far less difficulties are interposed in the way of penetrating the interior than in coming from Algeria). On the other hand, it is well known that Major Laing left maps, &c., in the hands of the Tawarek, who keep up a good understanding all along the frontier-line from Ain-Salah to Timbuctu.

"Arrived at Timbuctu, a Merciful Father will inspire me which road to adopt for my return-journey—it is impossible, at this stage, to present any plans formed on so remote a contingency!

"As to the sum which the Geographical Society kindly proposes to advance me, I beg to state beforehand that, confiding in its well-known generosity, I shall accept whatever they present me with as a special benefit; but as I do not know what is their intention, I must not specify. The Society is,

moreover, aware of the means at my disposal, which have been materially diminished by the requisite purchase of necessary instruments, such as barometers, for transport, thermometers, &c.

"I would remark, finally, that whatever sum the Society send, it should be sent with all speed, in order that I may start immediately by joining the caravan for Timbuctu, which is on the eve of starting from the Great Oasis.

"Your obliged servant,

"(Signed) ROHLFS GÉRARD.

"P.S.—I trust I need hardly mention that if the Royal Geographical Society should not approve of the route above laid down, I should in everything follow as far as practicable its prescriptions, and avail myself of the collateral information it may supply."

IV. *Copy of Council Letter in reply.*

"Sir,

"15, Whitehall Place, London, 10th Feb., 1864.

"I have laid your letters dated Oran, December 18th, 1863, and 24th ult., before the Council of the Royal Geographical Society. You ask in them for immediate pecuniary assistance in a journey you are about to undertake from Morocco to Timbuctu; and you give assurance that you will follow the directions of this Society.

"In reply, I have the pleasure to inform you that the Council have favourably considered your application. They are satisfied you will devote the same energy to your present undertaking, that brought your recent solitary journey from the Atlantic through Morocco to Algeria to a successful termination. They therefore place fifty pounds (50*l.*) at your disposal free from all conditions, save that you send frequent, full and precise accounts of your journey, together with copious collections of native itineraries, whenever opportunities shall occur of sending letters to Europe.

"Although the Council of the Royal Geographical Society abstain from hampering your movements by minute instructions, in a land where so much depends on accident, it would, no doubt, be acceptable to receive some remarks on the geographical importance of the several routes under your consideration. Nothing need be said of the way to Taflet; but of the two routes you mention, southward from that place, the one that leads to Tawat is unquestionably the most important. The oasis of Tawat is, perhaps, the most interesting to travellers in the whole of the Sahara; and if you succeed in reaching it, you would act wisely by making a prolonged stay in its neighbourhood, and collecting all the information you can of the routes that radiate from it.

"Any considerable accession to our present knowledge of the Tawareek language would be appreciated.

"Of the routes you might pursue from Tawat, either is full of interest. The recovery of the long-lost papers of Major Laing, which may still be preserved by some chief on the way between Tawat and Timbuctu would be eminently desirable; and on the other hand, if the route to Timbuctu be found impassable, you should bear in mind that a journey through the Jebel Hogar to Ghaat (for Tripoli) would pass through an unknown and interesting district.

"I remain, yours faithfully,

"FRANCIS GALTON,

"(Acting) Foreign Secretary."

2. *Communication on Mr. Palgrave's Paper.* By Rev. G. P. BADGER,
F.R.G.S.

11th March, 1864.

AFTER listening to Mr. Palgrave's most interesting account of his adventures in En-Nejd, delivered at Burlington House on the 22nd ultimo, I was very desirous of eliciting from him some information regarding the Wâdi Aftân; but, as there was no time to do so at the Meeting, I drew up the following queries on the subject, which were subsequently submitted to him:—

"You mentioned a 'labyrinth of watercourses' near the coast between Hufluf and El-Katif.* Do you suppose that the water proceeds from the Wâdi Aftân, and has that wâdi, or river, an issue, as a stream, into the Persian Gulf?

"Was there any water in the Wâdi Hanifah, and at what point does that wâdi, or stream, join the Wâdi Aftân?

"Did you hear anything of the principal sources of the Aftân? If so, where are they placed? Jomard supposes them to spring from the 'Aseir country, situated between the Hijâz and Yemen; in fact, he conjectures that the Wâdi Aftân (or river, as he calls it,) is a continuation of the Bisheh river, which, with its affluents, has its origin in the mountains of 'Aseir.

"There is another stream supposed to run into the Wâdi Aftân from the district of El-Harik towards the coast. Can you afford any definite information on the subject?"

Mr. Palgrave has taken such pains to answer these queries † that I very much regret not having availed myself more largely of his courtesy and experience. Before proceeding, however, to indicate several other doubtful points connected with the geography of El-Hassa, which the same enterprising traveller may find leisure to solve at some future period, I deem it desirable to state the grounds whereon my questions touching the hydrography of Central Arabia, with special reference to the Wâdi Aftân, were based. They are comprised in the following extracts from M. Jomard's Appendix on the Geography of Arabia, attached to M. Mengin's *Historique de l'Arabie*, under the head of *Cours des Eaux*. M. Jomard writes:—

"It is a very general opinion that Arabia possesses no rivers properly so called; that its streams are mere torrents; and that during the hot season the ravines through which they run are quite dry. . . . I am inclined to believe, however, that this idea is not to be received in an absolute sense. Arabian authors describe several rivers in Arabia. The Jihân Nâmesh places three in Yemamah alone, besides two others flowing towards the east and north; and the Aftân of El-Edrisi is a river with a very considerable course. It is quite certain, however, that none of these rivers is navigable.

"The mountains of Yemen have always contained, and still undoubtedly contain, many extensive basins, wherein the waters are confined by dykes. Of these, there are some of very ancient date, celebrated in the history of the country; and it is well known that the rupture of one of them (reference is here made to the famous dyke at Mareb, to the eastward of Sanâa,) is an event of considerable importance in the annals of the period antecedent to Muhammed. This basin is supposed to have covered an area of eighteen miles, leading us to infer the existence of streams from superior heights as well as of large rainfalls. Without placing much reliance on the four rivers which Ptolemy so liberally bestows on Southern Arabia, it is undeniable that Pliny, Strabo, Herodotus, and Diodorus Siculus concur in placing rivers in the peninsula. And now, when it is positively known that Arabia possesses several

* Generally written *El-Kutâif* by Arabian Geographers.

† His reply is given in full at the conclusion of this letter.

high mountains which are covered with snow and ice during a certain portion of the year, we are driven to admit that from these sources the water must flow in large masses into the neighbouring valleys and ravines, and mingle at the foot of the mountains. To this consideration we must also add the heavy rains which, during the season, fall abundantly in those districts.

"Now, if we find a basin with a continuous declination towards either of the two seas (the Arabian Sea and the Persian Gulf) wherein these waters flow, whether they be deep or shallow, navigable or not, would not such a stream be entitled to the designation of a river? For my own part, though I persist in believing that the ancients have been erroneously prodigal in placing rivers and streams over their maps of the peninsula, nevertheless, I do not think it can be fairly conceded that the country possesses nothing but simple torrents, and no other basins than insignificant ravines which are dry during the greater part of the year.

"These reflections have been suggested to my mind by studying the Arab chart of 'Ascir,* whereon are traced numerous watercourses. All these brooks, torrents or rivers have distinct names, and the same name is found written on the course of several of them, without any variation, at considerable distances, insomuch that it is difficult not to recognise the same river in such and such a course; as, for example, the Bisheh, which is represented as flowing continuously over a space of 78 leagues from its source to the sea; and where the reconnaissance of the Egyptian officers terminated.

"Now, if this line of water be laid down on a general map of Arabia, one cannot help remarking that its course is towards El-Yemâmah, which would be just where Arabian authors place the principal river Aftân, which runs into the Persian Gulf at El-Katif, after watering the province of El-Hassa. If this junction really takes place (which I do not affirm), we become acquainted with the source of the Aftân, the origin of which has been hitherto unknown; and we learn, moreover, that it is the issue or continuation of the river of Bisheh which was supposed to lose itself in the sands.

"This opinion, which is mere conjecture, acquires however a certain degree of probability from the fact that the Bisheh river receives three notable affluents, all having a considerable course, viz., the torrents of Ranîyah, of Tâbala, and of Théri, all of which are laid down on the Arab map. Is it not possible that this mass of water, thus increased in its flow, especially during the rainy season, continues its course towards the north-east, instead of disappearing in the sand? This point will be subject to serious doubt until some trustworthy traveller shall follow the stream in question where it emerges from the Wâdi Bisheh, and direct his course towards the north-east as far as the province of El-Harik (situated to the south-east of El-Yemâmah). I may further add that a large chain of mountains runs from the south-west to the north-east, starting from the Wâdi Shahrân, or the district of Bisheh; that this chain appears to join the large mountains of Toweik in the Derâyah; and that that direction is absolutely the same which I attribute to the river of Bisheh and to the upper part of the Aftân. I am quite aware that, according to the report of Captain Sadleir,† the Aftân becomes dry during summer; but it by no means follows that what may perhaps have occurred during a year of extraordinary drought takes place every year. It is, moreover, possible that in the

* Drawn up by some Egyptian officers who accompanied the expedition of Muhammed Ali against the Wahhâbis of that district in 1815.—G. P. B.

† It is to be regretted that Captain Sadleir's account of his trip across the peninsula is not more readily procurable. I have sought for it in every available quarter without success. That he supplied many details of his journey is unquestionable; for M. Jomard refers to his "Itinerary" as edited by Houghton, and I believe Mr. Walker had the pamphlet before him when he laid down Captain Sadleir's route on his large map of Arabia.—G. P. B.

course of several centuries, from the time of Ibn Haukal to that of Abulféda, the volume of water may have decreased considerably. Such a meteorological fact is not uncommon.

"To sum up the foregoing remarks: I do not maintain that a large river, corresponding with the Aftân of the ancients, flows now in a continuous stream from its source in the mountains of 'Aseir as far as the Persian Gulf, traversing the entire peninsula from south-west to north-east, in a direct line of more than 250 leagues; but I wish to notice particularly—

"1. The importance which seems to be attached to the stream of the Bisheh.

"2. That of its three affluents.

"3. Its direction, corresponding with that followed by the Aftân from the mountains of Towalk to the Persian Gulf.

"4. The absence of any known obstacle between the two parts of this stream. From whence we are authorised to infer that, at least in more ancient times, there was a continuous stream from the mountains of 'Aseir to the Persian Gulf.

"It was reported to M. Tamisier that a stream of water descended from Ed-Dowâsir, which passed by Ed-Derâyah and flowed thence into the Persian Gulf. Should this be true, it confirms my conjecture; for it demonstrates the existence of an incline between the south-eastern part of En-Nejd (which is the position occupied by Ed-Dowâsir), and the province of El-Kati,—an incline sufficient for the flow of water. Ed-Dowâsir borders on the province of Shahrân or the valley of Bisheh. . . . M. Tamisier adds that the torrent of Bisheh loses itself and reappears in Ed-Dowâsir. Hence we may infer that when the waters are at their height, Wâdi Shahrân and Wâdi Dowâsir are traversed by the same stream. As to the passage of the stream by Ed-Derâyah, I think it there joins the river of Wâdi Hanifah, where it issues from the province of El-Kharj; for it is certain that that river flows into the Aftân."

That M. Jomard's conjectures respecting the course of the Bisheh and the Wâdi Aftân had much to recommend them is evident from the fact that they were either copied or independently adopted by subsequent cartographers up to the present day; nevertheless, if Mr. Palgrave's investigations are entitled to be regarded as conclusive, they altogether upset that hypothesis, and necessitate several important corrections in the hydrography of our modern maps of Arabia.

First, with regard to the Wâdi Aftân. This, as we have seen, M. Jomard was inclined to extend to the sea on the Persian Gulf side; or, if not found actually to flow so far now, he presumed that it may have done so in former times. And on many of the most recent maps the supposed course of the wâdi is laid down as reaching to within a short distance of the coast, running, as in Mr. Walker's map, through the hilly range which bounds the district of El-Hassa* on the west. It was this uniformity which led me to inquire whether the numerous watercourses of the El-Hassa were supplied by the Aftân. That point may now be considered as definitively set at rest by Mr. Palgrave; since, according to his statements, the low mountains which bound El-Hassa towards the interior, running almost parallel with the coast, interpose a barrier against the flow of water from that direction towards the Persian Gulf. The hilly range near the village of "Djouh" (Mr. Walker's "Juniah?"), where it attains its highest elevation, we learn, for the first time, is called "Djebel Moghâzi." This range appears to be laid down in Mr. Walker's map with tolerable correctness, though in order to coincide more per-

* More correctly "l-Ahsâ," which is the plural form.

fectly with Mr. Palgrave's account it should be carried farther north towards Kweit.

M. Jomard seems to have assumed that the Aftân flowed as far as El-Katîf, where it emptied itself into the Persian Gulf; but I find no such stream laid down in the latest surveys of that part of the coast, and Lieutenant (now Colonel) Jopp, who visited El-Katîf in 1841, and who speaks of good water being most abundant in the town, and waterpits in the sand as very numerous from El-Hufhûf to El-Katîf, does not mention any stream as occurring between the two places. Mr. Palgrave's researches lead us to conclude that none of the water of the district finds its way to the sea.

Taking up the subject of the Wâdi Aftân to the westward of Jebel Moghâzi, I find from Mr. Palgrave that the very name was almost unknown. El-Edrisi expressly mentions it, though, with reference to M. Jomard's quotation from that author, I may remark that he is not justified in calling the Aftân "a river." The Arabian geographer styles it "Wâdi Aftân." Now, a *wâdi* means primarily a valley or ravine; secondarily, the bed of a stream; and lastly, the stream itself. In which of these senses he uses it in his description of El-Yemâmah is not obvious, but that of a river is undoubtedly the least probable. His words are, as translated from the original: "By El-'Ardh* in this country is meant Wâdi Aftân, which divides El-Yemâmah from top to bottom; and upon it are inhabited villages, extensive fields, date-plantations, and groves of trees." He then proceeds to give the names of thirteen of these villages, and remarks that they are contiguous to one another. Hitherto, the term "Wâdi Aftân" has been supposed to indicate a distinct valley; but a careful study of the foregoing quotation leads to the conclusion that El-Edrisi considered it as synonymous with "El-'Ardh," which appears to have been the name of the valley in ordinary use in the country; and if "Wâdi Aftân" was not a common designation in those days, it is not surprising that Mr. Palgrave scarcely heard it mentioned by the present inhabitants.

The "El-'Ardh" of El-Edrisi is most probably the same with the modern district called "El-'Aridh," and he perhaps took the name of the valley which he describes from the locality where it commenced; † for, according to Mr. Palgrave, it is from "Melka, near Deraïyyeh, in the Aaredh," that the "Wâdi Hanfseh" splits into two branches: "one goes due east to Deraïyyeh, the other south-east to Riadh. These branches reunite a little below Riadh, near Selamiyyeh. Here runs in the Wâdi Solei, from the southern Yemâmeh: it begins near the Houteh. Thus, its direction is from south-east to north-west. The united valley now loses the name of Hanfseh and takes that of Solei; then another (which I have forgotten), till it ends, on the skirts of Djebel Toweik, which it has thus traversed in all directions, at the wells of Oueisit, at about 60 miles from Riadh, and is utterly lost in the Dahnâ." This description of the continuation of the Wâdi Hanfseh from El-'Aridh, through the Wâdi Solei, to southern El-Yemâmeh and El-Harik coincides so fully with El-Edrisi's El-'Ardh, or Wâdi Aftân, which he represents as bisecting El-Yemâmeh from top to bottom, that I am inclined to consider the Solei as the actual representative of the ancient geographer's "Wâdi Aftân." The course or site of the valley so called in our maps to the eastward of Ed-Derâyah is occupied, according to Mr. Palgrave, by three wâdis, known respectively as the Farâk,

* He had mentioned El-'Ardh a few lines before in his Itinerary of the route between El-Yemâmeh and Meccah, which begins thus:—"From El-Yemâmeh to Meccah there is also a road, viz. from Yemâmeh to El-'Ardh one stage," &c. Gabriel Sionita in his Latin translation of El-Edrisi has attached the remark "i. e. Flumen," in a marginal note on the word El-'Ardh in the above quotation, which probably misled M. Jomard.

† In like manner Abulféda styles El-Kharj, the existing name of a district, "a Wâdi of El-Yemâmeh."

Ghour, and Ghweir (a diminutive form of Ghour), and by a part of the Dahna.

Further: we now possess satisfactory evidence against M. Jomard's hypothesis respecting the course of the Bisheh and its suggested junction with the Wâdi Hanifah. That river, we are led to infer, must be absorbed by the sands of the Wâdi Dowâsir, in the province of El-Aflaj, which wâdi, according to Mr. Palgrave, becomes entangled and ultimately loses itself in the Jebel Towaik. Taking this statement in conjunction with a subsequent one, "that there is no direct communication between the Wâdi Hanifeh and the Wâdi Dowâsir," it would appear that the Jebel Towaik extends much farther to the southward than has been hitherto supposed, and that the course of the range in that direction is to the eastward of El-Aflaj and the Wâdi Dowâsir; for Mr. Palgrave says that the track leading to the latter place from Riâdh crosses the Jebel Towaik.

It is much to be regretted that our enterprising traveller was precluded from carrying with him any instruments whereby he might have been able to determine the position of different localities with scientific accuracy; nevertheless, his researches constitute a valuable addition to our present limited knowledge of central Arabia, and indicate several important errors in the existing maps of that region.

Returning to El-Hassa and El-Katîf, we learn from Mr. Palgrave that the watercourses which abound in those districts spring from the low mountain-ranges on the west, and he attributes their origin to the great central plateau of En-Nejd * proper, at an elevation of several hundred feet above the coast.† Now, if this supposition is correct, does it not seem highly probable that the numerous springs existing on the island of Bahrein, and especially on the reefs where fresh water rises out of the sea at a depth of from one to four fathoms, have their source in the same plateau? The island, or rather islands, of Bahrein are generally low, and are situated only fifteen miles from the mainland, nearly midway between El-Hufûf and El-Katîf, and it is between these two places that the soil is described as being so saturated as to supply watercourses for irrigation which have to be crossed by small bridges made of date-sticks.‡ This is an interesting one in connection with the hydrography of Arabia, and deserves a fuller investigation than I am competent to give it.

Another subject which merits further inquiry is connected with the comparative geography of El-Ahsâ, and perhaps Mr. Palgrave's recent researches may enable him to clear up some of the existing difficulties. The principal

* *Nejd* means literally a highland.

† In like manner, if I remember rightly, Dr. Wallin was of opinion that there was a gradual incline from the uplands of the Nuffid to the shores of the Persian Gulf.

‡ This is the district known as *El-Ahsâ*, the original meaning of which aptly describes its principal feature, and was probably applied to it on that account. The word comes from the root *hdsâ*, to drink, to absorb; and its derivative nouns *Hisa*, *Hâsa*, (plural, *Hisd* and *Ahsâ*) signify a low sandy soil where rain is absorbed, or a pit dug therein to procure water. The name is given to similar localities in other parts of Arabia. There is one of these springs on the mainland of Aden Back Bay, supplied by a mountain torrent in the interior, which is called the *Hâsuah*.

I find this supposition of mine respecting the origin of the name as applied to the district of El-Hassa or El-Ahsâ corroborated by Abulûda, who remarks, speaking of that locality:—"It is said in the *Masharîf* that *Ahsâ* is the plural of *Hisd*, which means sand, into which the water sinks, and proceeds until it comes to the hard earth, which retains it; in this the Arabs dig and draw out water. *El-Ahsâ*, therefore, has become the proper name of a place among the districts of the Arabs."

places on the coast of that district, as marked on the modern maps and charts, are El-Katîf and Jilla Ojair,* and in the interior Hufhûf or Fîf.† ‡ The district appears still to be called El-Ahsâ, but we find no existing town with that name, although both Jilla Ojair and El-Hufhûf are sometimes interrogatively marked as occupying its site.

The following quotations comprise what the principal ancient Arabian geographers and travellers have recorded on the subject:—

El-Edrisi (A.D. 1150) says, "El-Ahsâ is a town on the Persian Gulf facing Awâl.§ It is a country of the Karâmata, and is a fine town. As to the city of El-Kutaif [El-Katîf], it is close to the sea, and is in itself large. From El-Kutaif to El-Ahsâ are two stages; and from El-Kutaif to Hamas, which is on the Persian Gulf, are two days."

And again: "To the north [of 'Ammân i.e. Omân] is the country of El-Yemâmah, and one of its cities is Hâjar, which is now in ruins. Therein resided the Queen Yemâmah in her time. . . . And from the coast of Hâjar to Basra there is a road by the shore, but it is unfrequented."

Abulféda (cir. A.D. 1300) describes El-Ahsâ as "a small city, abounding in palms and running water, and its springs are very hot. And El-Ahsâ [here he appears to refer to another town of the same name] is in the desert, and is in a south-westerly direction from El-Kutaif about two stages. Its date-groves are as extensive as the vale of Damascus and surround it on all sides. [Then follows the passage about the derivation of the word *El-Ahsâ*, given in a foot-note in a preceding page.] This is the Ahsâ of the tribe Beni Sâad of Hâjar, and is a residence of the Karâmata in Bahrein. It is also said that the Ahsâ of the Beni Sâad is a different Ahsâ from that of the Karâmata. El-Ahsâ has no wall, and between El-Ahsâ and El-Yemâmah is a distance of four days."

Ibn Batûta, who was cotemporary with Abulféda, and who visited those parts A.D. 1322, says: "I then travelled to the city of *Kutaif* (as if it were a word of the diminutive form from *Kut*). It is, however, a large and handsome place, inhabited by Arabs of the Râfidha sect, extremely enthusiastic, publishing their sentiments and fearing no one. From this place I proceeded to the city of Hâjar, which, however, is now called El-Hasâ. We have here a greater abundance of dates than is to be found elsewhere, and which are used as fodder for the beasts. The inhabitants are Arabs of the tribe of 'Abd el-Kais. From this place I travelled to El-Yemâmah, which is also called Hâjar, a beautiful and fertile city, abounding with water and gardens."

We readily recognise the El-Kutaif of the foregoing extracts in the modern El-Katîf; but where are we to place the two El-Ahsâs; since it appears tolerably certain that in former times there were two towns of that name: one on the coast two stages from El-Katîf, which seems to be that visited by Ibn Batûta, and which had originally been called Hâjar,|| and one in the desert, in a south-westerly direction from El-Katîf?

The place now known as Ojair, which is two stages from El-Katîf, and is described as the principal port of the district of El-Ahsâ, although it can boast of only forty or fifty dwellings besides the fort, corresponds, as to site, with the old maritime town of El-Ahsâ. The modern name also appears to con-

* *Jilla* is the Bédawy pronunciation of *Kalâa* or *Kalâat*, a fort or castle.

† I am not certain about the correct orthography of this name.

‡ The route between the two latter places was traversed by Lieutenant Jopp in two days, and that between Hufhûf and El-Katîf in four days, and he estimates the distances respectively at 35 and 70 miles.

§ The principal island of the Bahrein group.

|| Apparently the same Hâjar mentioned by El-Edrisi as in ruins when he wrote, for that also was on the coast.

firm this identification; for I think it not unlikely that the *Ojair* of our maps should be written *Hojaïr* (the diminutive form of *Hájar*), the original designation having in the course of time undergone a change just the reverse of that which has occurred in the case of *El-Katîf*. But how are we to account for the disuse of the later name of *El-Ahsâ*? Or, is *Ojair* still known by that name to any of the Arabs in the neighbourhood?

Abulféda locates the *El-Ahsâ* of the desert two stages to the south-west of *El-Kutaif*. I know of no existing town in that direction which can be identified with it unless it be *El-Hufhûf*, but that is four stages from *El-Katîf*. Granting, however, that much stress is not to be laid on the discrepancy in distance, is the modern town of *El-Hufhûf* ever called *El-Ahsâ*, or have the people there any traditional account of the site and history of the old town of that name?

Lastly, *El-Edrisi* mentions a maritime place called *Iamas*, two days distant from *El-Kutaif*. I find no such name in the latest surveys of the Persian Gulf.

I submit the foregoing queries and suggestions in the hope that Mr. Palgrave or some of the officers of Her Majesty's late Indian Navy may be able to elucidate them.

Before concluding, I shall venture an observation or two on some remarks made by Mr. Palgrave in the course of his spirited narrative delivered at Burlington House, and I feel persuaded that that gentleman will pardon the friendly criticism. He stated, if I remember rightly, that the prince whom he met at *Sohâr* was the ruler of 'Ammân; that *Sohâr* was the capital of that province, and not *Máskat*; and that the title of *Imâm* was improperly applied to its sovereign,—that it was not indigenous, and was first conferred on the then reigning prince by *Albuquerque*.

All this is incorrect. *Sohâr* is the capital of a small province of 'Ammân which is dependent on *Máskat*; and its present governor, *Seyyed Toorki*, is a younger brother of *Seyyed Thoweyni*, the recognised ruler of 'Ammân, to whom he is subject.

Before the arrival of the Portuguese, *Nezwah*, a city situated two days inland from the coast, was the capital of 'Ammân and the seat of its chief. After the expulsion of the Portuguese from *Máskat*, the successive native rulers made that place their capital, and it continues to be the sovereign's residence up to the present day.

The original title of the rulers of 'Ammân was *Seyyed*, or Lord; but some, for special reasons, were styled *Imâm*, as Arabian history fully testifies. The late *Seyyed Sa'id*'s father was so distinguished, and is always called "*Seyyed Sultân, El-Imâm*," or "*El-Imâm Sultân*" (*Sultân* was his proper name). *Seyyed Sa'id* never acquired that title from his own people, but Europeans having become accustomed to it through their intercourse with *Máskat* during the reign of *Imâm Sultân* continued to use it, and still frequently apply it to the existing ruler *Thoweyni*, although by the people of 'Ammân and by the Arabs generally he is simply styled "*Seyyed*."

Reply to the Queries of the Rev. G. P. Badger.

Having passed a considerable time in, and journeyed slowly through, the region in question, I reply, that, as far as I could make out, whether by myself or through the natives of the country—

1. The very name of *Wadi Aftan* (in the localities where maps place it, as in their neighbourhood) is almost unknown, the corresponding site being occupied by the valleys known as the *Wadi Farouk*, *Ghour*, *Ghōweir*, and part of the *Dahna*.

2. The watercourses of the Hasa and of Kathif spring, the former from the low mountain-range extending from s.s.e. to n.n.w., from below the Schāabeḥ and Hofhouf towards Koueit (though it does not reach it), and is called the Djebel Moghazi where it ranges highest (near Djoun); and the latter from the hills above Kathif, a small range nearly parallel with the coast, and the highest point of which is called Djebel Moscharrif.

Now, as the former mountain-chain (that which limits the province of Hasa to the interior) cuts across the imaginary course of Wadi Aftan nearly at right angles, the waters of that valley (did it exist) could never reach Hasa, much less Kathif, but would have to flow s.s.e. or n.n.w., and thus would go parallel to, not into, the Persian Gulf.

In fact, the Wadi Farouk, in its ultimate termination of the Ghour, is here stopped, and comes to an abrupt end as far as its easterly direction is concerned.

3. Wadi Hanifeh is ordinarily deprived of water *above* the ground-level, though the numerous wells all along it attest abundance of water at a very slight depth (varying from about 8 to 20 feet). When the water *does* flow, which happens occasionally in the winter, it is only for a few days, and as a torrent. Much rain fell about the 24th Nov. (1862), while I was at Riadh, in the valley, and no water flowed. But the people said that it did *sometimes*.

Wadi Hanifeh is a valley of a Y shape. It has a double origin; but both branches belong to Djebel Toueik. The first originates between the Kasim and Sedeir (but is considered as belonging to the latter province), near Zulfeḥ, and comes down from n.n.e. to s.s.w. as far as Shakrah in the Wochem. Here it joins with another valley, which originates below Oueizeh in the Kasim, near Douwademeh (these towns are somewhat misplaced on the map), and runs from e. to w. to Schakrah, where it joins the other. A smaller valley comes in from Kōuac, on the Nejed pilgrim-road, running from s.w. to n.e. All this forms the Wadi Hanifeh, which begins, properly speaking, at Shakreh. It then runs s.e.e. to Melka, near Deraiyyeh in the Aaredh. Here it splits into two branches; one goes due e. to Deraiyyeh, the other s.e. to Riadh. These branches reunite a little below Riadh, near Selamiyyeh. Here runs in the Ouadi Solei, from the southern Yemamiḥ; it begins near the Houteh. Thus its direction is from s.e. to n.w. The united valley now loses the name of Hanifeh, and takes that of Solei; then another (which I have forgotten), till it ends on the skirts of Djebel Toueik, which it has thus traversed in all directions, at the wells of Oueisit (at about 60 miles from Riadh), and is utterly lost in the Dahna.

Hereabouts it *ought* to join the Wadi Aftan; but, as I have already said, *that* valley does not exist. Besides, the nature of the Dahna, loose, shifting hills of sand, here extending over a breadth of 25 to 30 miles, precludes any real valley. It is not till one has *crossed* the Dahna and the high open grounds beyond it (here called the Nefoud, though quite different from the Nefoud between the Djouf and Djobbeh both in character and in locality) that one finds the Wadi Farouk running, it is true, from e. to w., but only for a short distance—about 15 miles, I should think, guessing by camel-pace.

4. From all this it is evident, that (A) no sources can be found to the Wadi Aftan, or to any ~~concurrent~~ valley, even though under another name. for there is *none*; (B) ~~the~~ the Wadi Hanifeh, which really fills up (at least in its continuation of Wadi Solei) a *part* of that line, has its origin partly in the n.w., in Sedeir, and partly in the w., below the Kasim. And by *that latter* direction it *does* run on, as numerous Arabs of the country told me, as far as the Meghasil, on the Mekka frontier.

But below the mountains of Aasir, and near Kelaat Bischa, commences the long Wadi Dowasir, which then runs from s.w. to n.e. till it entangles, and ultimately loses itself in the Djebel Toweik, in the province of Afadḥ, about

three days (camel-journey) to the s.w. of Riadh. I visited that province (the Afladj), and can affirm that there is no direct *valley* communication between the Wadi Hanifeh (and consequently the Wadi Solei and supposed Aftan) and the Wadi Dowasir. So the road leading up to Kelaat Bischa and Aasir is cut off. There is a track indeed which leads thither from Riadh, but has to ascend the Djebel Toweik.

5. As for the valley from Harik, I have already mentioned it. And I have too much reason to know it, having lain hidden for three anxious days in one of its winding recesses. It is the Wadi Solai. The Arabs say that beyond Harik, to the s., it is lost in the Dahna, or great sandy desert of the s. Of which (D.V.) more hereafter.

Note.—In all the true Nedjed (which consists of the provinces of Sedeir, Wochem, Afladj, and Aaredh—in a word, in the mountainous plateau, of an oval form called Djebel Toweik, and *excludes* the Yemameh, Khorj, and Harik to the s., Hasa to the e., and Ouadi Dowasir and Kasim to the s.w. and n.w., all these provinces being only called Nedjed, *improperly*, and by a sort of aggregative confusion), I have met with only *one* running stream—I mean running even in summer, and not as a mere winter-torrent. This one privileged stream was in the interior of the province of Sedeir, and high up in the steppes of Toweik. It had its rise at about three hours' distance from Mejmaa, the principal town of the province. Poor little thing! flowing out of its dark pool between its narrow and stony banks, it seemed almost as much surprised at finding itself thus straying to a distance from its source as I was at seeing it. Nor did it go far; the gardens of Djeladjil, at a short day's distance, being destined to absorb it—happy, doubtless, in thus devoting its brief existence to the service of one of the most ancient towns of Central Arabia.

Nor did I hear of any other. As for the water-springs, often very abundant, of the Hasa and Kathif, they belong to quite another level, that of the sea-coast. Their origin is doubtless in the waters of the central plateau—there absorbed under ground, and here bursting out into daylight at a level of several hundred feet below the Nedjed. Those of Oman, again, belong exclusively to its high mountains, from which they reach to the sea. And a few of them, as at W. G. P., most all, of Hasa and Kathif, are of a very high temperature. Omm Sabaa, a large source to the north of Hofhouf, at about 6 miles' distance, is so hot as hardly to permit one to dip one's hand in it.

W. G. PALGRAVE, S. J.

Paris, 3rd March, 1864.

P.S.—It is a curious coincidence that I had been much prepossessed with the idea of Wadi Aftan and looked forward to exploring it. But when, from the heights above Riadh, I first saw (on the morning of 13th Oct., 1862) the long blue range of Djebel Toweik far in the e., stretching due n. and s. between us and the Hasa, as far as eye could reach, I felt my hopes fade away; and my subsequent explorations only confirmed the effect produced by the first general and distant outline of that region.

W. G. P.

3. Notes on the Language of South Africa.

Extract of Letter from le Command. DON JORGÉ DE FIGANIERE, H.C.M.R.G.S.

(Communicated by the Chevalier Duprat, F.R.G.S., H.M.F.M.'s Consul in London.)

I AM persuaded there is no similarity between the two languages of Angola and Mozambique.

For the study of the languages "Ambunda" and "Congueza," we have the following works:—

'Dictionary of the Bunda's Language, or Angolense; translated into Portuguese and Latin.' Lisbon, 1804.

'Collection of Grammatical Observations upon the Bunda Language of Angola; to which is added a Brief Dictionary of the Congueza Language; to which is added a Fourth Column, containing the Words of the Bunda's Language similar to those of the Bunda Language.' Lisbon, 1805.

Each work was composed by Fr. Maria de Cannacatim, Apostolic Missionary of the Angola and Congo Mission.

'Art of the Angola Language.' Lisbon, 1697. By the Jesuit Pedro Dias.

'The Nation of Angola sufficiently instructed in the Mysteries of our Holy Faith.' Lisbon, 1642. By the Jesuit Antonio de Conto.

'Christian Doctrine, newly translated in the Language of the Kingdom of Congo, by order of Padre Matheus Cordozo, Theologist of the Company of Jesus.' Lisbon, 1624. Published at Rome in the year 1650.

'Explanation of the Christian Doctrine in Portuguese and Angolense, for the use or the Missions in the Interior of Angola.' Lisbon, 1855. Reproduction of another in Latin, Ambunda, and Portuguese, printed in the year 1784, supposed to be in Rome; with a print by Francesco de Saelis Ferreira; and an Appendix, forming a Guide of Conversation in the two languages, Portuguese and Angolense.

With respect to the languages of Mozambique, Sebastiao Xavier Botetho, at page 386 of his excellent work 'Statistical Memorandum upon the Portuguese Dominions of Oriental Africa,' printed in 1835, has the following: "As it is very difficult to discover the origin of the languages spoken by the various people of Oriental Africa, we are of opinion, founded on the best authority, that the Caffre language is the common origin of the languages of all this region, but divided into so many dialects that the various tribes are almost entirely unintelligible to one another."

When the Arabs took possession of this part of the globe, they gave to the nations the name of Caffres, or Unbelievers of the Koran, and at the same time imposed on them their habits and their language, which is very different from the language spoken by the Moors of Morocco and of all the Barbary coast; so that we now find considerable similarity between many Arab and Caffre words.

Generally, the Caffre dialects are composed of words very short, sweet, and sonorous, as they are very rich in vowels, simple, and open, pronounced with a sharp accent on the penultimate syllable; not through the nose nor guttural, with the exception of the dialect of the Caffres of Santa Luzia river, in the territories of the King Capela Inyack and Matola, and at the Bay of Sourenço Marques, is derived from the dialect Makove, having all of them their common origin in the language of Hottentots; they keep the nasal sound as well as the guttural, but they differ in the accentuation and termination of the words.

The natives of Inhambane, the Landins, and those who inhabit the low and high "Quiteve," pronounce their words with greater suavity, and their dialect is a mixture of the language of Monamotapa and Matibana. All the Caffre inhabitants of the lands near the mountains of "Lupata" have dialects derived from the Monomotapa, such as the dialect Mongo, used by the Caffres who live near Rios de Senna; the dialect Bororo, used by the Caffres of the same name who inhabit the lands between "Rios di Senna" and "Tete," the most civilised of all the Caffres, and the only one that observe some rules of syntax in their discourses; the dialect Moviza, which is almost the pure Monomotapa, because those Caffres traffic continually throughout all that immense region; the dialect Maravi, the population using which inhabit one-half of that large tract which extends to Algoa.

The natives of the kingdom of Zinganiassa, Cotango, and Abutua speak, with very little difference, the Monomotapa language. It should be noted that this language is more cultivated than all the others, as it can boast of particles.

The Caffres of Tete, Senna, and Quillimane have dialects derived from this same language, mixed with words of other dialects of Caffres in the neighbourhood, but with so little affinity that they do not understand one another. Of all the dialects of the Caffres, but very few are understood away from the territories that they inhabit.

At Quillimane, in the interior and along the coast, are the territories of Matibana, now incorporated in the kingdom of Macua; and farther in the interior there is the kingdom of Moja, which occupies an immense territory extending to the coast of Mozambique, passing under many chiefs, as far as the neighbourhood of Melinde, and southward to the mouth of the Zambezi river.

All these Caffres, by contact with the Arabs of Quitangonha and Sancedo, with whom their territories are conterminous, and by the neighbourhood of the Portuguese, to whom they are subjects and tributaries, have mixed their language, which is Monomotapa, with Arabic words and Portuguese, altered in the terminations, augmented with particles so various that each of those people has a particular dialect, except the Macuas, who live near the sea, whose language is also that of the Caffres of Quilloa, Senna, and Mozambique. Near the kingdom Macua is that of Maurusa, a savage nation, which in the sixteenth century invaded Quilloa, Melinde, and all the coast of Zanzibar. Their language is entirely unknown, and quite different from all the others in accentuation and pronunciation. The general opinion is that it is derived from the Macua, Hottentot, and Arabic language, as spoken by the Caffres of Mogadoxo, Tungene, and as far as the coast of Mombaca (Mombas), in the middle of which are situated their territories; besides, the language Majojo, spoken by the natives of Mombaca, Tungue, the islands of Zanzibar, Pemba, Monfia, Angvane, Comoro, and Mulali is a mixture of the dialect Macua and of the Arabic idioma, but very much corrupted. The inhabitants of our islands of Cabo Delgado speak this dialect with very little difference.

PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED 29TH JUNE, 1864.]

SESSION 1863-64.

Ninth Meeting, April 11th, 1864.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*F. S. Fitzpatrick, Esq.*; *Capt. Lamoreock Flower*; *S. Keir, Esq.*; *E. Blore, Esq.*

ELECTIONS.—*Sir Victor A. Brooke, Bart.*; *A. H. Dick, Esq., M.A.*; *Richard Fort, Esq.*; *Henry Jeula, Esq.*; *W. W. Kiddle, Esq., R.N.*; *James Laforest, Esq.*; *Rev. John Mills*; *Hon. Leopold Powys*; *Hon. C. J. Powys*; *Richard A. L. Phillips, M.A.*; *W. R. Taylor, Esq.*; *Edward Thomas Wakefield, Esq., M.A.*

ACCESSIONS TO LIBRARY.—‘Notes of a Cruise in H.M.S. *Fawn*, in the Western Pacific, in the year 1862, by T. H. Hood.’ ‘A Sketch of Assam, with some Account of the Hill Tribes, by an Officer in the H.E.I.C.’s Bengal Native Infantry, in Civil Employ.’ Continuations of Transactions of various Societies, &c. &c.

ACCESSIONS TO THE MAP-ROOM since the last Meeting, March 14, 1864.—Denmark: Plan of Düppel, with its Fortifications.—Nörrejylland, Plate 8, presented by the War Office, through Sir Edward Lugard.—Kaat over Slesvigs Fastland, scale 1:100,000, on 3 sheets. Admiralty Charts, up to publication.

The PRESIDENT said the Secretary would read a short communication upon a subject which had attracted some attention among geographers, as to a lake having two issues. Various papers upon the point had appeared in the ‘Athenæum’ and other journals; and the gentleman who made this communication mentioned two instances of the kind, which had come under his own observation in Norway.

MR. SPOTTISWOODE then read the following

Letter from EARDLEY T. BLACKWELL, Esq., to SIR RODERICK I. MURCHISON.

8, Upper Park Place, Richmond, March 14th, 1864.

SIR,—My attention was called last summer to certain letters in the 'Athenæum,' questioning the accuracy of Captain Speke's assertion, that the great lake "Nyman," in Central Africa, had more than one outlet. I see also that this subject is touched upon in the Proceedings of the Royal Geographical Society, issued the 25th of February this year.

It has been represented to me that mention should be made of a fact, known to myself (and probably to others in this country), that lakes having more than one outlet occur in Norway.

The most interesting of these lakes is called the "Lessøe-værks-vand," lies under 62° 13' north latitude, and is close to the high road connecting the valleys of Gulbrandsdal and Romsdal. The considerable rivers "Lougen," and "Rauma," escape from opposite ends of the lake, the latter reaching the Atlantic by the Romsdal's fjord at Veblungnes; while the former, after a longer course in a south-easterly direction, eventually joins the Glommen, which enters the sea near the Swedish frontier.

Thus the whole of Norway south of these rivers may be said to be an island.

I should mention that the sheet of the Norwegian Government Map (Amtskart) showing this, is in my hands in England; and I shall be happy to send it to yourself, or to any other gentleman desirous of such confirmation of my statement.

I remain, Sir, yours with the greatest respect,

(Signed) EARDLEY T. BLACKWELL.

THE PRESIDENT said that, at a former meeting of the Society, Colonel Lefroy mentioned cases in North America with which he was perfectly well acquainted, and other gentlemen had affirmed that there were lakes in different parts of the world that had two issues. It must constantly happen, where the watershed is at no great elevation, that the determination of the water to one side or the other is a phenomenon that might easily occur.

MR. DUNCAN thought the case just recorded hardly bore reference to the outlets we had heard of from Captain Speke. The outlets were both in one direction, while most of those we had heard of flowed in different directions.

THE PRESIDENT said, Captain Speke had never asserted that there were two distinct outlets in one direction; he only examined one outlet himself, the other he only heard of from the natives. It rested, therefore, upon no real authority that the two outlets had the same direction.

The first Paper read was—

1. *On an Overland Expedition from Port Denison to Rockingham Bay in Queensland.* By A. J. SCOTT.

Communicated through the COLONIAL OFFICE.

THE Expedition, which was under the leadership of Mr. Dalrymple, was undertaken with the object of ascertaining whether there was the possibility of establishing a dray-road from the Valley of Lagoons to Rockingham Bay, which the writer described as a first-class port, only 75 miles distant from the Lagoons; while Port Denison, the present port of shipment, is upwards of 200 miles. The Paper was accompanied by an official letter on the subject of the expedition,

from his Excellency Sir George Bowen to the Duke of Newcastle, from which the following are extracts:—

“The station occupied by Mr. Scott and his partners, on which they have already placed above 25,000 sheep and cattle, is situated at a distance of more than 1000 miles from Brisbane, in the fine pastoral country surrounding the ‘Valley of Lagoons,’ on the basaltic table-land first discovered by Dr. Leichhardt. This rich and beautiful *plateau*, though so far within the tropics (the Valley of Lagoons lying between the 18th and 19th degrees of south latitude), enjoys a healthy and delightful climate, owing to its considerable elevation above the level of the sea. In June Mr. Scott found the water of the Lagoon sometimes frozen over in the morning with ice that would bear a pebble thrown on it. The present port of shipment for the Kennedy District is the town of Bowen; at Port Denison, distant above 300 miles; while Rockingham Bay is distant less than 100 miles from the Valley of Lagoons. Foreseeing that it would become an object of vital importance to the settlers in the northern part of the Kennedy District to have a nearer port of shipment, I carefully examined the neighbouring coast in September, 1862, in conjunction with the late Commodore Burnett, on my return in H.M.S. *Pioneer* from my expedition to Cape York. Commodore Burnett was of opinion that there are two good anchorages in Rockingham Bay, at either of which a port might be opened. It remained to discover a gap practicable for bullock-drays in the mountain-range which runs parallel to the coast, and this was the main object of the expedition described in the enclosed Report. A ship will shortly be despatched to meet another overland party at Rockingham Bay, where a new port will probably be opened in the course of the year 1864.”

The Paper, after describing the overland course from Port Denison to the Valley of Lagoons, proceeded to narrate the journey in search of a passage through the coast-range. A detachment of the party first marched to Mount Lang, 30 miles distant from the Lakes, with a view to ascertaining from its summit the most practicable route. Mount Lang is a hill composed of basaltic rock and lava, rising abruptly to the height of about 800 feet from the table-land. Mr. Scott supposed it to be the crater of an extinct volcano, and mentioned having three times crossed streams of lava flowing from the northward into the Valley of Lagoons. Deep fissures and chasms occur frequently in these streams, some of which are full of water, green, clear, and of immense depth; the vigour of the vegetation proving that there must be perennial water everywhere beneath. The trees are of great size, and an infinite variety of

flowering shrubs, some of them of great beauty, clothes the sides and the tops of the lava-streams. On reaching the summit of Mount Lang a clear view of the coast-range to the east was obtained, distant about 40 miles, and a low gap was discovered, towards which the whole party then directed their steps. The needle, when placed on the rocks, was found to be deflected four points easterly,—a circumstance which Mr. Scott believes to have led Leichhardt to place Mount Lang several miles too far to the westward. The region between the Lakes and the coast-range is undulating, and consists of open forest country, with long narrow plains, and rich abundant pasture. In traversing it they met with several camps of natives, who resort here to hunt kangaroos, and who are a fine, athletic race, of much lighter colour than the natives of the south. In some of the camps representations of men and women in the attitudes of the "corroboree" were seen, drawn with a sharp stone on the inside of box-bark. About 9 miles from the junction of the Great Antill Creek with the Burdekin they came upon a chain of lagoons, the southernmost of which, about 3 miles in circumference, was named by the party "Lake Lucy." Beyond this the travelling became very difficult, owing to the boggy nature of the soil; and at a point distant only 20 miles from the Pelican Lakes (their first starting-point) the party were compelled to retrace their steps to the Valley of the Burdekin in search of a more practicable route to the north-east. The valley of the river itself seemed to offer the desired opening. It averaged about 2 miles in breadth. Numerous lagoons, covered with water-lilies of various kinds, lay along both sides of the channel, and there was most excellent pasture. The country on the tops of the ridges which bounded the valley was of a very inferior description, the grass being worthless for pasturage and the timber stunted. During two days they were obliged to travel along the valley, but afterwards, finding the ground more firm on the tops of the ridges, they ascended, and thus advanced 25 miles to the north-east. At this point they came upon a branch of the Burdekin flowing from the south-east, and found extreme difficulty in fording it, owing to the boggy nature of its banks. From their encampment on the right bank of this stream they heard the distant roar of waters, which was afterwards ascertained to proceed from a cascade 20 miles away. Continuing their course next day, 15 miles to the north-east, among the hills of the coast-range, they encamped at a point where a view of the sea was obtained, Goold Island being distinctly visible. A deep gorge was then seen stretching to the north-west, between their position and the highest part of the coast-range; the sides were precipitous, and about 1000 feet high.

Through this gorge flows, in its course towards Rockingham Bay, a large river, which Mr. Scott supposed to be the same that formed the large waterfall in escaping from the table-land through the coast-range. The party now descended in a thick fog to a small valley at the foot of the range. On following the stream flowing through this valley for a few miles, they discovered that it must be one of the heads of the Burdekin; so the obvious inference was, that they might have followed the river up to this point without crossing the range at all. The country now opened out, and a succession of lightly-timbered forest-ridges was seen, abundantly grassed and watered by small streams. They continued their journey to the south-east, and at a distance of 15 miles from their previous encampment passed over to the watershed of Rockingham Bay. The land on the coast was flat, and apparently swampy. In the range was an opening formed by the valley of the large river, already mentioned, flowing from the westward. Mount Lang bore a little to the north of west, and Goold Island nearly due east. To the south-west Mr. Scott could trace the valley of the Burdekin the whole way to the Pelican Lakes, by which a road might be obtained without any obstacle. It was impossible, however, to reach the coast, owing to the impenetrable tropical jungle extending on all sides; an attempt was made, but they were obliged to desist, and finally to return to the station in the Valley of Lagoons. The author concluded by declaring the intention of himself and party to undertake another journey for the purpose of opening a road; adducing, in proof of the necessity of the road, the rapid progress of settlements in this extremely rich pastoral district. In three years the stations of the Queensland colonists had been pushed forward 500 miles towards the north, and a territory as large as the British Isles had been during the last two years more or less densely occupied by the flocks and herds of the squatter. In another year the advancing settlements would reach the shores of the Gulf of Carpentaria.

The PRESIDENT said that the Paper was of great value, not only from the character of the gentleman, who is a Fellow of the University of Oxford and a settler in the country, but from the very clear manner in which he had described the products of the country. He had proved himself a good geographer in determining all the positions that he visited, by latitude and longitude. It was a valuable addition to our knowledge of Australia, and showed how inviting a field for colonisation Queensland must be. The author stated that the climate agreed well with Europeans, and that large flocks of sheep are thriving in that very latitude in which some gentlemen thought sheep could not flourish.

SIR CHARLES NICHOLSON suggested that the discussion should be taken after the next Paper had been read.

The second Paper read was—

2. *A Communication from SIR GEORGE BOWEN to the DUKE of NEWCASTLE.* Containing Reports upon the Formation of a New Settlement at Cape York, at the Northernmost point of the Australian Continent; and upon the completion of the Survey of the Inside of the Great Barrier Reef, off the North-east Coast, by Commander ROBINSON, R.N.

Communicated through the COLONIAL OFFICE.

THE suggestion of a station near Cape York was made by Sir George Bowen, Governor of Queensland, in a despatch of 4th April, 1860; and the Lords of the Treasury and Admiralty having concurred in the general project, his Excellency and Commodore Burnett (the senior naval officer in Australia) received instructions to visit the district with a view to ascertaining the best site for an establishment. The voyage of inspection was made on board H.M.S. *Pioneer* in August to October, 1862, and the result was communicated in a series of reports, from which the following are extracts.

SIR GEORGE BOWEN relates that having embarked in Moreton Bay on 27th August, and fallen in with the south-east trade-wind, the *Pioneer* made a good passage under canvas, inside the Great Barrier Reef, to Booby Island, in Torres Straits, the farthest limit to the north-west of the jurisdiction of Queensland. From the 10th to the 22nd September the ship was at anchor near Cape York, principally in Evans' Bay and Port Albany, during which time he and Commodore Burnett carefully examined the neighbourhood of the north-eastern point of the Australian continent. They came to the conclusion that the proper site for the projected settlement was Port Albany, which combined almost all the required advantages. Close to the landing-place was found good and safe anchorage, sheltered from all winds, for a limited number of vessels: while whole fleets might ride safely at anchor, at no great distance, in Evans' Bay during the south-east monsoon, or in Newcastle Bay during the north-west monsoon. There is also abundant pasturage, good soil for gardens, and plenty of timber, stone, and lime, both on Albany Island and on the mainland, from which the island is separated by a deep channel only one-third of a mile broad. The temperature was remarkably cool for the tropics and healthy for Europeans, the thermometer marking never above 85° during the expedition. Above all, a plentiful and evidently never-failing supply of fresh water was found, although their visit was at the close of an unusually dry season. Near the north-east point of Albany Island a rill of pure water, fringed with flowering shrubs and grasses, trickles over the cliff into a small natural reservoir, which was

named the "Fountain of Arethusa," from its close resemblance to the Homeric fountain in Ithaca. The place chosen for the proposed settlement was on the bank immediately over the anchorage at Port Albany; but the future town—destined, perhaps, to be one day the Singapore of Australia—would doubtless grow up on both sides of the narrow channel separating Albany Island from the mainland. It would be named Somerset, in acknowledgment of the readiness with which the present First Lord of the Admiralty had lent his aid to an undertaking of such great importance to the interests of the British Empire in Australia. Very friendly relations were established with the small tribe of aborigines frequenting the neighbourhood, and the party were enabled to communicate with them by the help of the excellent vocabulary of their dialect printed in the Appendix to the 'Voyage of H.M.S. Rattlesnake.' Their physical characteristics differed in no essential respect from those of the same race elsewhere; but their arms, canoes, and other implements were of a somewhat better description. The general aspect of the coast along which the *Pioneer* sailed, in the voyage to and from Cape York for nearly 3000 miles, resembled that of Southern Italy and Greece. The mountain-ranges of northern Queensland have much of the picturesque outline and rich colouring of the Apennines in Calabria, and of the hills of Euboea and of the Peloponnesus; while the group of islands through which they threaded their way often reminded them of the isles of the *Ægean* and *Ionian* seas.

COMMODORE BURNETT reports that, having decided to examine first that part of the mainland of the northern extremity of Australia which lies to the westward of Cape York, inside Endeavour Strait, the *Pioneer* proceeded, on the 10th September, from Booby Island to an opening on the said mainland in longitude 142° 12' 20", which proved to be too shallow for the light boats to get more than one mile up in salt water, although the *Pioneer* (drawing 12 feet) anchored within two cables' length of its entrance. Hence, on the same day, the ship was taken to and anchored within the channel of Dayman Island, inside of which Simpson's Bay is marked on the Admiralty chart. During the 11th September lines of soundings, taken across Simpson's Bay, showed that it is a worthless anchorage, full of shoals and very irregular soundings, and fit only for very small craft. The whole south coast of Endeavour Strait is very sandy close to the sea, with numerous salt-water creeks, into some of which light boats may get. From the appearance of the mouths of many of them, and from the grass growing near them, he felt satisfied that a great deal of fresh water must find its way by them to the sea at certain seasons. From the 12th to the 15th September the ship was

anchored at Evans' Bay, the country about which was examined, and small supplies of fresh water found in holes (*i. e.* native wells), in the two positions only marked in the Admiralty plan of the bay. Whilst anchored here he visited what has been described in the 'Australasian Directory' as "Mew Rivulet," but found the water perfectly salt. Evans' Bay was a moderately good but contracted anchorage, with poor holding-ground, and quite exposed to winds from the north-east and east. The ship then proceeded to Port Albany, and Albany Island was traversed in all directions. He found, in company with Sir George Bowen, numerous springs of excellent water, which appeared to be never-failing, although the dry season was at this time at its height. Albany Pass was a spacious and fair roadstead, with nowhere more than 13 fathoms at low water. Port Albany is convenient for large steamers, and its adjacent bays on Albany Island are good and safe for small craft. The mainland from Bishop Point to Vallack Point was next examined. In Shallow Bay no fresh water was found. In Somerset Bay fresh water seems good and abundant at two places. In Fresh-water Bay was found abundance of fresh water breaking through the sand at different parts of the beach, and also small streams apparently coming from swampy ground. The best site for the first establishment of a healthy station would be on Seymour Point, Albany Island. This point is not commanded by any height near it, and has open forest country close inland from it on Albany Island.

MR. WALTER HILL, Director of the Botanic Gardens of Brisbane, who accompanied the expedition as botanist, states that he carefully examined Albany Island during three days, and found it upwards of three miles in length and one mile in its greatest breadth. Its outline is irregular, from the number of bays with small rocky headlands. The land consists of three-fourths open forest, the rest being scrub. Several hundred acres of the open ground have scarcely a tree upon them, and are thickly covered with excellent grasses suitable for grazing purposes. The greater part of the soil consists of red sandy loam, mixed with small ironstone nodules, and varies from 6 to 15 inches in depth. In addition to grazing capabilities, there are several spots where the soil is well adapted for the growth of most useful vegetable productions. The rocks are either a stratum of ironstone in irregular masses, or a very coarse sandstone. The latter is suitable for building purposes. On the eastern side of the island are large beds of coral, of the best description for making lime. During three other days he extended his researches to two or three miles into the interior of the mainland opposite Albany Island. One important result was the finding of two fresh-water

streams, about 8 feet wide, and running in different directions: one emptying itself about one mile from Fly Point, the other nearly opposite Port Albany. The latter waters a fine valley, where trees grow in great luxuriance. Along the valley are some beautiful clear flats, with fine open forest ground. The soil of these flats is of great depth, and consists of black loam. The variety of trees on the mainland is much greater, and they are of a better description for building purposes than those found on Albany Island. Between Mount Bremer and Evans' Bay, close to Cape York, there is a belt of scrub and a tract of forest. The soil here consists of rich black sandy loam, about 24 inches in depth. The soil at Evans' Bay is not adapted for the cultivation of any plants that are used for commercial purposes, on account of its general sterility; but fresh water of excellent quality was found in two native wells in the scrub at the back of the beach.

CAPTAIN ROBINSON, commander of the *Pioneer*, subsequently addressed several communications to Sir George Bowen on the subject of the new settlement, and also on the inner route for vessels inside the Great Barrier Reef. In the first, dated May 10th, 1863, he describes the manner in which he had executed the mission entrusted to him of planting fruit and cotton trees on Albany Island; concluding by saying that this work would, in one or two years, prove of inestimable value to mariners and crews of ships passing from all portions of the world, who, without diverging 5 miles from their course, would then obtain the supplies they most need, and which cannot now be obtained at a less distance than 1500 miles. In the second letter, dated July 2nd, 1863, he describes the advantages which the inner route offers to the colonists of Queensland. He first reverts to the publicly-expressed opinion of Commodore Burnett, that the Great Barrier Reef, hitherto regarded by seamen as a bugbear, was one of Queensland's greatest blessings, being a natural breakwater to the South Pacific Ocean, and making the intervening sea from the Percy Islands to Cape York *one great and secure harbour*. The greater safety of the "inner" over the "outer" route appears to be allowed by everybody; but it was supposed to have a disadvantage in ships being obliged to anchor five or six times, causing a loss of time. But there is in reality no loss of time, and it is better to have the trouble of anchoring five or six times in secure waters than to endure the anxieties of the outer route, where, after all, anchoring has to be resorted to three times, exposed to the ocean-swell, which sets with much violence against the reef. According to the 'Australian Sailing Directory,' twenty-one days is a fair passage from Sydney to Booby Island by the "outer route," and twenty-five to thirty

days a fair passage by the "inner route;" but the shortest passage known was performed by the inner route, namely, by H.M.S. *Rattlesnake* and two merchant-ships, which cleared Booby Island on the twelfth day after leaving Sydney. The advantages and facilities are very great for the establishment by a colonial company of a line of steamers to run fortnightly between Sydney and Singapore, *via* the "inner route," and Cape York.

The PRESIDENT said he was happy to find that the views of Sir George Bowen, the enlightened Governor of Queensland, were sustained by such great naval authorities as had been quoted, and particularly by the Hydrographer to the Admiralty, Captain Richards, whose report upon the subject he was sure would be considered of national value.

SIR CHARLES NICHOLSON said the difficulties which were encountered by Mr. Scott in endeavouring to get from the coast-range down to Rockingham Bay were precisely those which might have been predicated by any one at all conversant with the physical geography of Australia. The great coast-range, extending from Cape York on the north, down to Wilson's Promontory on the south, exists with scarcely any interruption, forming an abrupt escarpment towards the sea, and gradually trending off to the plains in the interior. In colonising the country from the coast the great difficulty has always been to get over this great barrier. The first colonists of New South Wales occupied the country in the neighbourhood of Sydney for twenty-five years before they were able to get across the Blue Mountains. It is only on two or three points, where rivers make their way to the coast, that access is afforded into the interior. One of these points is the valley of the Fitzroy River; there is a depression there in the coast-range, and facilities are afforded for getting into the interior plains of the country. It was this difficulty of getting across the dividing range which led to such disastrous results in the expedition undertaken by Mr. Kennedy, who ultimately perished in his exploration farther north. The description given by Mr. Scott and his companion Mr. Dalrymple, who is well known in the history of Australian expeditions, is confirmatory of the statements made by Leichhardt, who first discovered the country, and who gave the names quoted by Mr. Scott, the Lynd, the Mitchell, the Gilbert, and the Burdekin. Leichhardt described this central country as of surpassing beauty, and as consisting of basaltic table-land. He was afraid Mr. Scott rather under-estimated the difficulties of getting from the dividing range down to the coast; probably the only way would be to approach from the coast upwards, following the course of some river which found its way into the sea at that point. It was interesting to observe how rapidly the process of exploration and occupation is going on in this magnificent region. He was afraid almost to speak of its future destinies. He had had opportunities of seeing considerable portions of Australia, and he had never seen any part which impressed him so much with its vast capabilities as the southern part of Queensland. No doubt there would be difficulties with reference to the climate. It was impossible to ignore the fact that it is a tropical region, and if agriculture is to be pursued in that country, he believed it would not be by the Anglo-Saxon population, but by some Asiatic race, probably the Chinese.

The PRESIDENT: But as a pastoral country?

SIR CHARLES NICHOLSON: As a pastoral country, no doubt, it could be occupied by Europeans. Unfortunately, the rivers which fall into the Gulf of Carpentaria have bars at their mouths; therefore, unless more easy access were found into the interior, it was not probable that any towns would be formed there. The most likely place for a settlement on the Gulf of Carpentaria

would be at Investigator Strait. He was glad to find that so much emphasis had been laid upon the utilising of the magnificent route for navigation on the east coast provided by the Barrier Reef, extending a thousand miles in length, and securing tranquil waters and freedom from the annoyances and dangers of a sea-voyage. Government had been somewhat remiss in not establishing more actively a line of steam-communication by this route. Progress, however, is being made. We have now steam all the way round along the south coast, and up as far as Port Denison. The next point would be Rockingham Bay, and then Cape York; and then they would see what a short distance it was from Cape York to Timor, with which the Dutch Government has a fortnightly steam-communication. The Dutch Government had just made a contract with an English Company for a line of steamers to traverse regularly the whole of the islands with which they have connexion in the Pacific Archipelago. As these steamers would come within a short distance of the coast of Australia, it would be an embarrassment and scandal to the English Government if they did not take the opportunity of extending steam-communication up to that point. He also thought the Government might be induced to take some steps with a view to the exploration of New Guinea.

CAPTAIN RICHARDS said, on his return from America, a short time since, he had permission to come home by way of Australia, on purpose to pass through the inner route, with the view of forming an opinion as to its practicability for navigation, and also respecting the formation of a settlement at Cape York. He passed through the route, and he considered it a very easy route, free from any difficulties in the way of navigation. The action of the Government in sending out an expedition a few months ago on purpose to establish a colony at Cape York, and to maintain communication between it and Moreton Bay, was one of the most important things that had been undertaken for the last fifty years. Until that settlement was established the country to the north could not be opened, for there was no nearer outlet at present for the produce of the country than Moreton Bay and Port Denison. He knew Mr. Scott very well; he was a wealthy and an enterprising man, and a first-rate wool-grower. He met him at Brisbane; and he also saw Sir George Bowen, and he might be allowed to say that too much credit could not be given to him for all that he had done for the colony.

The PRESIDENT asked if Captain Richards was of opinion that the inner route was the preferable one.

CAPTAIN RICHARDS said that he preferred the inner route himself. There was no doubt, as soon as there was a settlement at Cape York, that steam-communication would be established with Moreton Bay. He thought it very probable, however, that mail-packets from Singapore would take the outer route, and that the inner route would be taken for the eastern coast navigation. The attempts made to colonize North Australia during the last twenty-five years had failed because of the want of communication with other parts of the world, but now everything was favourable in that respect, and he thought the present attempt was made in the right place. Ten years ago Brisbane was a village; it had now a population of 50,000 people. Port Denison had been established two or three years, and in five or six years it would perhaps be as populous as Brisbane. There was another point at Endeavour River favourable for a settlement; and he believed in twenty years' time the whole coast would be as thickly populated up to Cape York as it was at points lower down. It was his opinion, and he believed it had been proved, that it was in vain to attempt the colonization of a country until that great precursor of civilization and commerce had been achieved, viz., the nautical survey of its shores. Twenty years ago this inner passage from Cape York to Moreton Bay was the most intricate in the world; now it was as easy to navigate as the English Channel. Silently but steadily this great work had been progressing during these long years, and it was undeniably one of the most gigantic and splendid undertakings ever carried out by

any nation. It had been accomplished by Captains Blackwood, Owen Stanley, and others, whose names in connexion with it would never be forgotten. He was glad to recognise among those present Commander Evans, one of the most able and eminent of those officers who had laboured in Torres Strait with the late lamented Captain Francis Price Blackwood.

The PRESIDENT was sure they had listened with great attention to what had fallen from Captain Richards. He believed with that officer that comparatively few persons were acquainted with the labours of the distinguished men engaged in the nautical survey of this coast. They were not unknown, however, to the future navigator, who would ever cherish the recollection of these bold and enterprising seamen, by whose labours these coasts had been rendered navigable to all the nations of the earth. He was particularly grateful to Captain Richards for having called attention to the feats of his predecessors, which had been admirably brought to a completion by Captain Richards himself.

MR. J. CRAWFURD said he believed it to be impossible to colonise tropical regions with the Anglo-Saxon race. They were too hot for Europeans to inhabit and multiply in. Sir Charles Nicholson admitted that it would be necessary to get Chinese to do the labour. It would not be a European colonisation, where the majority of labourers were Chinese. There would be two distinct races; the Chinese would be the helots, and we should be the masters. It was said the thermometer was never higher than 85°, but they had not been told how low it fell.

SIR CHARLES NICHOLSON said it had been stated that the creeks were covered with ice at Table-land.

MR. CRAWFURD said that the Table-land was only 2000 feet high, consequently the fall of the thermometer could never be more than 4° or 5°. With respect to the question of sheep and wool, and cattle, he must confess he was surprised to hear of the vast flocks that were being driven up to the fifteenth degree of latitude. He ventured to say that at the fifteenth degree of latitude, even at 2000 feet above the level of the sea, no great quantity of wool would ever be produced. He admitted that the sheep would thrive there, get fat, and furnish a large carcase; but why should it produce wool, which it did not want? The expectation of forming a second Singapore at Cape York seemed futile, for what produce were the steamers to get there? Cape York would only be of advantage as a port of call to British ships passing through Torres Straits. With reference to establishing steam-communication with the Dutch possessions, why Timor, the nearest island, was 1000 miles distant.

CAPTAIN EVANS said there was one point deserving of interest in connexion with the settlement at Cape York, and that was New Guinea. About 100 miles from Cape York were the mouths of a vast river, which he in vain endeavoured to ascend with his ship owing to the shallowness of the water. The boats went up, and they found a large population, and the country abounding in sago and palm, and magnificent forest-trees. The houses of the natives were 300 feet long. Of this country, so near to Cape York, we knew nothing, except that there was this river, whose mouths extended over 60 or 100 miles of coast-line. The opening up of this country, viewed in connexion with a settlement at Cape York, was a point that ought not to be lost sight of.

MR. SAUNDERS thought the observations of Mr. Crawford as to the impracticability of the north coast as a place for settlement by European labourers ought to be taken into consideration. When Governor Bowen proposed to form a settlement at Cape York, were we to understand that he meant such a settlement as we had at Brisbane, where persons could take 40 or 50 acre lots, and work them by their own labour? He imagined that no such course would be practicable along the northern coast. Nobody ought to think of going to the northern coast who had not been well seasoned in the southern part of Australia. He protested against any proposal that would have the effect of sending out the

poorer class of persons, who would have to labour with their own hands, to the northern part of Australia. He saw no objection to sending out capitalists, who had the means, if they did not like the country, to leave it. There was ample room for the investment of capital in stock; for we could not doubt the statement of Leichhardt that his cattle fattened along the road, sustained as it was by the evidence of squatters. He did not think Cape York would ever be a place of trade; a great many ships might pass, but passing ships did not make a trade. We had to look for the development of the trade of Northern Australia in those parts to which ships could penetrate the farthest into the mainland, whence to draw their exports; and it was the bottom of the Gulf of Carpentaria that would be the great seat of the export and import trade of North Australia. He believed the Liverpool River was the place most worthy the attention of capitalists for settlement, to the north and west of the Gulf.

DR. KINKEL said Mr. Crawford had maintained that wool had never been grown in a tropical country, or in a country possessing the natural conditions of the north of Queensland. He thought Egypt was a country the temperature of which agreed very much with what we knew of North Queensland. Now, in Egypt not only had wool been grown, but we were able to prove that the oldest woollen stuffs in existence had been manufactured in Egypt. The rugs surrounding the bones of a mummy in the British Museum—the king who was buried in the pyramid—were of wool. Again, it was almost certain, from the paintings of the ancient Egyptians, that the covers of their horses were woollen rugs. The existence of sheep in Egypt at a time previous to the invention of linen was proved by paintings found by Lepsius in the tombs of the officers of the Fourth Dynasty, at least 2000 B.C.

MR. DUNCAN said the navigation of the inner route of the Great Barrier Reef was of great importance to the mercantile marine. No doubt it was available for steamers and men-of-war. Last year he lost a fine ship in the outer passage, and he had been listening attentively for information respecting the possibility of the inner passage for sailing-vessels. Of course, much would depend upon the prevailing direction of the winds, and he should like to have some information upon this point.

CAPTAIN RICHARDS said the inner passage was perfectly clear and navigable, and the wind was fair for nine months in the year. Charts and sailing-directions had been published, so that no ship master could be at a loss.

THE PRESIDENT, in closing the discussion, said that those who had been in the country really thought that sheep could thrive up to nearly 18° of latitude, approaching to the southern end of the Gulf of Carpentaria. He must do Mr. Saunders the justice to say that on former occasions he had spoken of the southern part of the Gulf of Carpentaria as a good place of settlement for English colonists. Between that point and Cape York there was a great difference of temperature. That difference did not depend entirely upon latitude; for it was a matter of fact that the cooling properties of the vast plateaux of land near the head of the Gulf of Carpentaria did limit the heat to such an extent, that he had no doubt, from what he had heard from colonists who had sheep there, that wool might be grown and that Englishmen might live in those regions; but not at the extreme northern point to which they were now invited to go. Up to about 19° north latitude, he was sure there was room enough for all our extra population for many years to come.

He took that occasion to express the deep regret of the Council and himself at the death of their excellent Treasurer, Mr. Robert Biddulph; and stated that, as it was absolutely necessary for the transaction of the business of the Society that a successor should be immediately appointed, they had, subject to the sanction of the Anniversary Meeting, appointed Mr. Reginald T. Cocks, to fill the vacant post.

The Meeting then adjourned.

Tenth Meeting, April 25, 1864.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Henry Jewla, Esq.; Dr. O'Callaghan; Richard A. Long Phillips, Esq.*

ELECTIONS.—*Charles H. Allen, Esq.; Edward L. Betts, Esq.; Lieut. L. M. Carmichael; Major Henry Drew; Hugh Falconer, Esq., M.D., F.R.S.; Sir Richard G. Glyn, Bart.; Robert Carr Glyn, Esq.; Charles Harding, Esq., F.R.S.; Wilson Lloyd, Esq.; David L. Morgan, Esq.; Thomas Ogilvy, Esq.; Le Chevalier Joaquim de Almeida Portugal; F. S. Powell, Esq., M.P.; Thomas R. Quicke, Esq.; Arthur C. Ranyard, Esq.; P. M. Tait, Esq.*

ACCESSIONS TO LIBRARY.—A complete set of Castlenau's Works, 15 vols. folio and 8vo.; presented by C. R. Markham, Esq., F.R.G.S. Continuations of Transactions of various Societies, &c.

ACCESSIONS TO MAP-ROOM.—New Zealand: Otago; by J. T. Thompson, Esq. (2 copies). Australia: showing Stuart's Route across the Continent; by E. Weller, Esq., F.R.G.S. McLeod's Middle-class Atlas.

EXHIBITIONS.—Seat and Canopy of the King of Dahomey; presented by Commodore A. P. E. Wilmot, C.B., African Station.

The PRESIDENT called attention to the new large map of Africa upon the wall, which had been prepared in the Map-room of the Society, under the superintendence of Capt. C. George, and which denotes all the recent discoveries in that region of the globe. He remarked the improvement on the former map, which is now worn out from constant use.

In connexion with the first Paper to be read, the President stated that at the opening of the present session he had called attention to a very touching and interesting letter from Mrs. Petherick, describing the very great difficulties that herself and her husband had encountered in endeavouring to reach Gondokoro, to establish that communication with Captains Speke and Grant which it was the object of the Society to accomplish. The present communication is the long-expected diary of Mr. Petherick himself. It is accompanied by a registration of the observations, astronomical and otherwise, made by himself and Dr. Murie, his travelling companion, and also by a detailed account of his expenditure, and so forth, in the management of the expedition which was entrusted to him.

MR. SPOTTISWOODE then read the first Paper, which was entitled—

1. *Explorations in the Region of the Upper Nile.*

THE Paper is Mr. Petherick's Report to the Society of the course followed in carrying out the work undertaken by him.* In order to place the matter in a clear light, the Council have thought it

* The geographical details of the land journey, with Mr. Petherick's map, will be published in the 34th volume of the 'Journal.'

advisable to preface the Report by the following extracts from previous numbers of the Society's Proceedings.

8, Cork-street, June 19, 1860.

MY LORD,—In consequence of the refusal of Her Majesty's Government to support the application for pecuniary assistance made on my behalf by the Royal Geographical Society, for the purpose of enabling me to meet Captains Speke and Grant with an armed escort, and to furnish them and their party with provisions and the means of transport down the Nile, and the Council having liberally headed a subscription with 100*l.*, to which your Lordship has invited the Fellows of the Society to add their names, a few remarks upon the following two subjects will not be out of place:—

1st. The nature of the assistance I should propose to give Captains Speke and Grant to contribute to their safe return down the Nile, and the expenses thereof.

2nd. The probable expense of an independent Expedition from Khartûm to follow up the course of the Nile to its source, in combination with the aid to Captains Speke and Grant, as stated above.

In order to afford the greatest possible assistance to the Expedition of Captains Speke and Grant, I consider it necessary to place three well-provisioned boats, under an escort of twenty armed men, at the base of the cataracts beyond Gondokoro, in the month of November, 1861.

With forty armed men, natives of Khartûm or the adjoining provinces, I then would undertake personally to penetrate into the interior as far as the Lake Nyanza, with a view to effect a meeting with the Expedition and assist it through the hostile tribes between the Lake and the Nile, and return thence by the boats to Khartûm.

Should I be unsuccessful in meeting with the Expedition, I would then endeavour to establish beyond a doubt whether or no there was any connexion between the Lake and the Nile.

If it should be considered desirable, and my means were sufficient, I would proceed along the western shore of the Lake to the extreme point of Captain Speke's late discovery, so as to connect, by a series of observations, North with South Africa; after which, having met the Expedition or not, I should return to my boats at the cataracts and thence to Khartûm.

I believe that, with the facilities at my command in the shape of boats and arms, the expense of such an expedition would amount to about 2000*l.*

In the event of so large a sum not being available, I would then propose to place two well-provisioned and armed boats, under the superintendence of one of my own men, on whose integrity I could confidently depend, to await the arrival of the Expedition at the above-named cataracts from November, 1861, until June, 1862.

This precaution I consider most important to the success of Captains Speke and Grant, and the expense would be, on a moderate calculation, 1000*l.*

Sixteen years' experience on the Nile, and the brilliant examples of illustrious countrymen, have created in me the desire and ambition, that by placing my experience at the service of the Royal Geographical Society, I may aspire to the proud eminence of adding to British glory by assisting in the discovery of the sources of the Nile.

Single-handed, unfortunately, I have not the means to achieve it, other important interests compelling me to devote my attention to regions which I have had the honour to make known to the Society; but if so far in the enjoyment of the confidence of the Royal Geographical Society and the nation, as to obtain sufficient support, I feel *that* in me, which will command success.

It strikes me forcibly that the most feasible method of accomplishing the object above stated, is to follow the stream.

For this purpose I would supply myself with a boat, either by taking out one in parts from this country, or by constructing one on the spot; the materials for which, with the exception of timber—that being abundant in the locality—I would take with me, as well as also artisans from Khartûm.

The men and materials I would endeavour to place above the cataracts early in 1861, so that in November of the same year, with the setting in of the north wind, I should be in a position to navigate the unknown Upper Nile; and during the same season—I should hope to arrive at its extreme navigable point, where it would be necessary, in order to keep up my communications, to establish a station.

During the rainy season, if the course of the stream continued from the south, the prevailing south wind would prevent farther navigation during the inundation; but if it proceeded from the west or east—which latter I think probable—it might offer no impediment to the sailing of my boat, and I might continue my explorations.

Should the stream continue running from a northerly direction, the heavy rains would, I fear, prevent my following it by land until September or October, 1862; and it would probably require the whole of the ensuing dry season until February, 1863, to secure the object of the Expedition, when, God willing, the flood would bring me down the river to the cataracts of Gondokoro, and thence via Khartûm, home to England.

Such an expedition would involve boats on the White Nile from Khartûm to Gondokoro; one or two, probably a larger and a smaller one, on the Upper Nile above the cataracts of the latter; and two establishments—one above the said cataracts, and the other at the extreme navigable point of the stream, in order to keep up my communications for all necessary supplies.

An undertaking to ensure the accomplishment of so glorious an object, if put before the nation under the influential and powerful patronage of the Royal Geographical Society, would, I would fain hope, be eventually carried out; and when it is considered that the proposed expedition might be effected with the double object of independent discovery and of rendering the assistance to Captains Speke and Grant, by supplying them with provisions and transport on their way down the Nile without any increased expense, I believe that in consigning the proposition to the able hands of your Lordship, the mystery that for ages has attached itself to the sources of the Nile is doomed to give way before the powerful influence and unflinching enterprise of Great Britain.

Having placed my opinions before your Lordship, I have the honour to subscribe myself

Your Lordship's most humble and obedient servant,

JOHN PETHERICK, F.R.G.S.

*The Right Hon. Lord Ashburton,
President of the Royal Geographical Society, etc.*

*Agreement between Consul Petherick and the Royal Geographical Society,
Feb. 4th, 1861.*

1. "Consul Petherick undertakes, in consideration of the receipt of 1000*l.* towards the Expedition up the Nile, to place two well-armed boats, during November, 1861, at Gondokoro, with a sufficient stock of grain to ensure to Captain Speke and his party the means of subsistence upon their arrival at that place."

2. "If Captain Speke shall not arrive in November, 1861, that Consul Petherick shall proceed with an armed party southwards towards Lake Nyanza to meet him."

3. "If Captain Speke shall arrive at Gondokoro before June, 1862, Consul Petherick promises to assist Captain Speke in making any explorations which Captain Speke may deem desirable."

4. "It being farther understood that in the event of Captain Speke not having arrived by that time at Gondokoro, Consul Petherick shall not be bound to remain beyond June, 1862."

Instructions for Consul Petherick's proposed Expedition up the White Nile in Aid of Captains Speke and Grant, Feb. 8th, 1861.

The President and Council of the Royal Geographical Society having ascertained that the amount of subscriptions will not be sufficient to enable you to remain two years to the southward of Gondokoro, and thus to carry out your proposition in full, proceed now to give you instructions whereby the great object of their desire—the rendering assistance to the expedition under Captains Speke and Grant—can be best accomplished with the means at their disposal.

By leaving England in March, you will be enabled to reach Khartûm in time to equip two boats with a supply of provisions sufficient for your own and Captain Speke's party until July, 1862. With these you will proceed to Gondokoro, where it is very desirable you should arrive early in the month of October; that is to say, as soon as possible after the cessation of the rains. You will then, in the event of Captain Speke not having arrived, leave a trustworthy person with a sufficient force in charge of the boats, the maintenance of these until June, 1862, at Gondokoro, being of primary importance.

The next object the President and Council have in view is, that you should proceed in the direction of Lake Nyanza, with a view of succouring Captain Speke, and bringing him and his party in safety to the depot at Gondokoro.

The President and Council do not attempt to lay down any limit to this exploration, but, fully trusting in your known zeal and energy, feel assured that you will do all in your power to effect the above-mentioned object, without serious risk to the lives of the party under your command.

Should the junction with Captain Speke be effected, which there is every reason to believe it will be, previous to June, 1862, you will consult with him as to the best means of employing the period which will elapse before the change of the monsoon will permit you to descend the Nile, in extending our knowledge of the adjoining region.

In entrusting you with the sum which has been subscribed for this purpose, the President and Council, considering themselves accountable to the subscribers for its proper expenditure, will require an account of its disbursement. If circumstances should prevent your meeting with Captain Speke's expedition, they consider that you are entirely relieved from the responsibility of remaining yourself or detaining the boats longer than June, 1862, at Gondokoro.

The President and Council desire to impress upon you the necessity of obtaining as frequently as possible astronomical observations for the ascertainment of your geographical position, and that you forward, as often as opportunity offers, copies of your journal to the Secretary of this Society.

A list of instruments, together with instructions respecting their use, and notices of such phenomena as it is likely you will have an opportunity of observing, is herewith appended, to which also are added Manuals on Ethnology, Botany, and Zoology; to each of which sciences, as well as Geology, you

will have an opportunity of adding much new information. In addition to the 'Hints for Travellers,' published by this Society, particular instructions relative to the peculiar character of the great river you are about to explore have been prepared, and which, it is to be hoped, will assist you in making observations which will throw much light on the geography of this region.*

The President and Council take this opportunity of expressing their admiration of the spirit of enterprise which has induced you at great personal risk, and possibly considerable pecuniary loss, to undertake the charge of this expedition; and they hope, under God's providence, you may not only succeed in affording succour to the *Zambesi* at a period when it will be most in need of it, but that you will succeed in opening a new field to the civilizing influences of commerce.

Extract from Proceedings at Evening Meeting, February 25th, 1861:—

MR CONSUL PETHERICK said the President had so well described the difficulties that lay in the way of Captain Speke's progress from Lake Nyanza to the Nile that it was unnecessary for him to add more. It was only reserved for him to assure the Geographical Society that he would do the utmost in his power to carry out their object of effecting a meeting with Captain Speke. Naturally, any Englishman situated as he would be in those regions, hearing of the coming of a countryman, would do his utmost to see him; therefore he took no merit to himself for promising to do that. The circulars of the Royal Geographical Society in connexion with his expedition pointed out that there was a wish that he should proceed towards the sources of the Nile, provided Captain Speke did not succeed in discovering them. For carrying out such an expedition as that, the sum of 2000*l.* would be required, as has been stated in the circular. However, little more than half of that sum had been subscribed, which would only suffice for carrying out the first part of the project of the Society, namely, that of meeting Captain Speke and supplying him with grain and other necessaries. In case he did not meet with the Captain at Gondokoro, he purposed proceeding into the interior in order to bring about the meeting.

Mr. Petherick's Report is as follows:—

MY DEAR SIR RODERICK,

Abu Kuka, or Marnoak, July, 1862.

My last from Khartûm, informing you of the departure of two boats on the 15th November, 1861, under the direction of one of my agents, Abd-el-Majid, with a statement of his instructions, and a copy of a letter to Speke, in the happy event of a meeting, will, I trust, have been duly received.

* *List of Instruments, Books, &c., supplied to Consul Petherick by the Society.*

Quintant, by Cary; Sextant, by Casella; Telescope, with tripod stand, by Troughton and Simms; Prismatic Compass, by Troughton and Simms; Artificial Horizon, by Troughton and Simms; Mathematical Instruments, pocket-case, by Cary; Boiling-water apparatus, complete, by Casella; Chronometer, by Barrand and Lund; Parallel Ruler, 12-inch, by Cary; Protractor, ivory, 6-inch, by Cary.

Raper's Navigation; Nautical Almanacs, 1861-2; Blank forms for computing, viz., 3 Field-books; 2 Register 4 Days' work; 3 Latitude by Merid. Alt.; 2 Latitude by Circum. M. Alt.; 2 Time, and 3 Pocket-books; 29 Memoranda, &c.

On my return from England to Khartûm I unfortunately learned that the majority, nay, I may say all of the traders on the White River, regarded the ivory trade a pretence to cover their slave-hunting propensities; and the minority, who still trafficked in ivory with the natives, carried on their business, not as formerly by legitimate barter, but by robbing one tribe of cattle to pay another for tusks of ivory, and their carriage through the country to their boats. The natural result was the necessity of larger armed escorts to proceed with any degree of safety through the country, as Arabs—and I regret to say the white man also—had become devoted enemies to the negro populations. These circumstances I refrained from citing prior to my departure from England, from motives which perhaps, in the minds of some, might have created a suspicion that I was raising difficulties from hearsay; but the more so, from a desire to prevent anxiety in those at home connected with the gallant travellers whom I have undertaken to meet.

You will recollect I had stated a much larger sum would be required for the expedition I have entered on than that which I actually received. Her Majesty's Government, contrary to expectation, having declined its support, 2000*l.* were attempted to be raised by the members of the Royal Geographical Society.

This enterprising spirit of the President, Vice-Presidents, and members of the Society kindled so strong a desire in myself to support their views by all the experience, energy, and means in my power; and the subscriptions falling short of the sum attempted to be raised, I accepted one-half of the sum proposed, well knowing it at the time far from sufficient to meet the expenses necessary for an effective push into the unknown interior.

Owing to the circumstances cited, to realise funds for the provision of the elements necessary for a substantial expedition—one that under the blessing of Providence should command success—became a duty, to acquit myself of which was the cause of my prolonged sojourn at Khartûm. Ready-money was scarce; and to effect important sales of goods in my possession, for cash, traders from the frontiers of Abyssinia, and ivory-merchants from Massâwa and the Hedjas, had to be waited for: thus vexatious delays were occasioned; and it was the end of February before I had realised sufficient to enable me to depart from Khartûm on the 20th of March, in support of the advance-party under Abd-el-Majid.

In addition to the two boats sent forward on November 15, 1861, another large boat was despatched to the Bahr-el-Ghazal, to remove my men there located, to the support of Abd-el-Majid at Gondokoro. Thus, uniting a force of seventy-five men, he would be able

to proceed to a station of mine, some six to eight days' journey south-west of that place; and, in case of necessity, he could still further increase his party from that establishment, in order to proceed southwards in the direction of the Lake Nyanza.

The difficulty of transport appeared to me the greatest obstacle to overcome, as the traders, in lieu of beads, now pay their porters with a plundered cow or bullock each: it was clear beasts of burden became a necessity, and consequently forty donkeys were purchased. To convey them, two boats had to be procured; thus my personal expedition was augmented to four boats.

The *Kathleen*, a new boat, fitted up for the occasion at Cairo, had experienced such delays in surmounting the cataracts of Wadi Halfa and Dongola, that in default of its arrival I was constrained to the use of a favourite old boat, re-named the *Lady of the Nile*, for Mrs. Petherick, myself, and the lad Foxcroft, who had accompanied me from England as insect collector. The next boat was occupied by two medical gentlemen and an elephant-hunter, a young Lombard, from Pisa, Carlo Evangelista, engaged at Khartûm. Dr. Murie left England subsequent to us, as Photographer and Secretary and joined at Korosko. Dr. Brownell, of the United States, volunteered at Khartûm to accompany the expedition as Botanist. In addition, the boat contained merchandise, and on the deck fifteen donkeys. The third boat, independent of the hold full of grain and goods, carried a couple of saddle-horses on the deck; and the fourth contained also large quantities of provisions and twenty-five donkeys.

Thus in the afternoon of the 20th March, 1862, with the good wishes of the Governor, who, instructed by H.H. the Viceroy, had rendered me several services, and an incessant discharge of firearms, intermingled with hearty shouts for a happy return, from a crowd collected on the shore, we sailed down the Blue Nile. At sunset we had turned the point, and made fast, in sight of Khartûm, to wait the arrival of sundry truants.

In the event of the necessity of a boat, to navigate some unknown water, of larger dimensions than any portable gutta-percha punt, I brought a quantity of nails, and the carpenters to build one were supplied by the Egyptian Government. Waiting for these men detained us until March 22nd.

The consorts had preceded; and the *Lady of the Nile*, under three large lateens, followed at a spanking pace. It was late in the season, and, the duration of the north winds being uncertain, the captains had augmented their sails to imprudent dimensions, so that prior to our quitting Egyptian territory all, more or less, came to grief.

The *Lady of the Nile* weathered it best: two boats had their spars shattered and sails torn; but the doctors' boat fared the worst, as, bowling along, we passed them in tow, with mast and rigging over the side. But fortunately a temporary boat-building station beyond Aleis, called Hellet Donagla, was only some 15 miles a-head, and leaving the roughly-handled boats to follow as best they might, the *Lady of the Nile* continued her course before a stiff north-east breeze, in order to prepare for the crippled craft. The arsenal was reached at 9 A.M., March 23rd.

Four days were occupied in mending spars, changing others out of laid-up boats, putting in a new mast, and reconstructing the doctors' cabin, which, smashed by the falling yard, frightened, but happily did not injure, its occupants.

At sunrise, March 28th, the boats again sailed, and everything went on prosperously until March 30th, when, to our great sorrow, the winds began to fail: towing along the banks was now resorted to. On 31st March we reached Hellet Kaka, formerly the principal Shillook settlement, but now deserted. A notorious slave-hunter, Faki-Mahomed Hheir, assisted by numerous horsemen of the Bagara tribes, and numbers of armed freebooters, in boats from Khartûm, had spread ruin and devastation far and wide: the heretofore friendly Shillooks that have escaped massacre and slavery are now houseless, driven to the bush for safety.

On the 4th of April the first intelligence from Gondokoro was reported to us by the rais or captain of a trading boat. My agent, Abd-el-Majid, had opened a new country; but there were no tidings of Captains Speke and Grant. On the 8th of April we passed the Sobat, which we found greatly swollen. We passed the Giraffe; and on the 13th I obtained the first interview with the aborigines, who hitherto at the sight of our boats had fled.

April 15th.—Entered the Nouaer district, and on the 17th arrived at the confluence of the Bahr-el-Ghazal. Thus far, although impeded by the great height of vegetation, we had been able to tow along the banks; but now uninterrupted marsh extended on either side to the horizon. Our small boat and a canoe now became invaluable, as, with their aid, lines were sent out to be made fast to the reeds, and round robins towed home. Thus we managed to make good some six or seven miles a day. Mosquitoes became intolerable.

April 28th.—Frequent heavy showers had fallen, and interfered with our progress. A boat from Gondokoro conveyed tidings that our exploring party were still in the interior. They did not know their whereabouts; neither had any tidings been heard of Captains Speke and Grant.

May 2nd.—A heavy storm, accompanied with fearful thunder and lightning, ending in a gale, carried away spars, and more or less crippled each of our boats. Refitted hastily, and in time to profit by the fag-end of the hurricane, now manageable, and made good the equivalent of some half-a-dozen days' towing.

May 6th.—Made the Nouaer settlement of Aliáb. Our carpenters were set to repair our broken spars on real *terra firma*, an object we had long lost sight of. The cargoes of both boats were landed to dry; and the destruction of property from constant wet was found to be considerable. The doctors with their consort were astern, and not visible; and we proceeded to caulk our consort.

May 12th.—A young Maltese with two boats arrived from Gondokoro: his establishment he stated to be some ten days' journey south of that place, and east of the Nile; but he could convey no tidings of the Speke expedition. The doctors and their companion boat arrived; and, both requiring caulking and various repairs, I was fortunate in the possession of men equal to the emergency. No end of damaged goods was brought to light from the cargoes; and both doctors were laid up with fevers. From the leaves of the Delaeb palm, a species of *Borassus*, our boatmen occupied themselves in making towing-lines.

May 16th.—In company with the boat containing our horses we left our moorings, towing against a southerly wind; and on the 19th of May met Abd-el-Majid and his three boats returning from Gondokoro, which place he had left eight days ago. In reply to my expression of surprise at meeting him, he said everything in his power had been done to meet Captain Speke. The expedition from my station, owing to his (Abd-el-Majid's) illness, had been entrusted to Mussaad, the agent in charge, and had made good seventeen marches southwards, to a place called Wanja, in Kakoa. But owing to the troubled state of the country, and deficiency of the most ordinary kind of food, Mussaad and his party, after four days' subsistence on roots and bulbs, were obliged to return. No tidings had been gleaned of the Speke expedition; but he had learned the existence of an extensive sheet of water, stretching westwards, distant about four days' march farther south; but whether lake or river he was unable to ascertain.

May 20th.—The canoe sent on from the boats in the rear brought us the painful intelligence of Dr. Brownell's death. In order to ensure to his remains as decent an interment as possible, we continued to a locality, reported by Abd-el-Majid not far distant, where a spot of dry land would answer the purpose. On the 21st poor Brownell was laid in the centre of one of a few prominent dry spots,

formed and deserted by white ants, which being above the level of the marsh promised to retain the deeply-regretted remains of our companion unpolluted and protected from external injury. I read the Service, and a volley of musketry fired over the brave fellow's grave terminated the mournful ceremony. A fearful storm and heavy rain contributed to aggravate our discomfort.

On the 25th of May another most unpleasant circumstance, but of a different nature, transpired in the discovery of eighteen slaves in Abd-el-Majid's boat; and, after having proved the latter as the capturer and owner, I handcuffed him myself, and ordered him to be consigned to the Governor of Khartûm, to whom I addressed the proofs of his guilt. The children and girls, fortunately rescued from slavery, I consigned to another boat, to return with us to Gondokoro and their homes.

May 25th.—Mussaad and twenty-five men were removed from the homeward-bound boats to our own, and, after an exchange of a boat for a larger dahabyeh—one that had performed the service of conducting my men from the Bahr-el-Ghazal to Gondokoro—I consigned it to Dr. Murie, and we followed our various destinations: viz.—the *Lady of the Nile* and three boats up-stream; one boat to Khartûm, with Abd-el-Majid a prisoner; another to the Bahr-el-Ghazal; and the *Bayooda* to my station on the Sobat.

June 4th.—A severe hurricane caused the dragging of our anchors and sent us on the reeds, from which, without damage, we got off and continued towing. The weather cold and showery.

June 11th.—After days of dead towing and frequent heavy showers the collection of lowering clouds astern boded a favourable breeze, and no sooner had the storm burst than our sails were spread. Gallant was the behaviour of each boat, and, blowing harder, onward we raced, when, crash! Surkatti's yard gave way; and, letting go the sheets, the huge sails flapped and roared above the storm. Half-a-dozen of our men were tossing in the small boat to the assistance of our disabled consort, and all hands hauling home our rebellious sheets, we again resumed our course.

June 13th.—A bad leak half-filled the *Lady*, and we all felt the old boat could not much longer resist the rough treatment of heavy gales. On the 14th of June we had another storm, and, carrying on until our sails were rent, we scudded under bare poles.

June 15th.—We had now reached Gaba Shambyl; the right Nile bank entirely inundated, but the left, to which we made fast to repair damages, presented a fine plain, skirted with thick and noble forest. Our small boat we sent down stream to meet and assist the doctor's boat in towing, it being desirable the boats should lay up

together for the night, as the negro tomtoms on shore denoted the aborigines on the alert, and they might perhaps attempt an assault at night. Herds of antelopes were in sight, and I succeeded in stalking and bagging one and severely wounding another, when nightfall put an end to tracking it.

June 16th.—Donkeys and horses were put on shore, and an exhilarating ride proved the latter to have suffered nothing by confinement. We soon found my antelope of the last evening. Quantities of vultures hovered over it, and the greater part of the carcase had been devoured by lions, the tracks of which were evident. Many of our men were ailing, and one of the shipwrights died; the poor fellow was buried under a large tree.

June 17th.—At 5 P.M. we arrived at Mr. Binder's station, formerly De Malzac's. During a long ride in search of material for cordage I shot a large male baboon, and his skin was preserved by the doctor and assistant.

June 19th.—Heavy rains deluged our grain; and we spread it out to dry. But for tarpaulins, another storm at noon would have undone our handiwork.

June 20th.—Repeated showers and storms, and blowing from the south we were windbound until the next day, when, with Surkatti and horses in tow, we struggled onwards; our men, nothing daunted, carolled home the lines with lighter hearts than our drenched position could justify. On June 22nd there was more heavy rain.

June 23rd.—At dawn two canoes from Poncet's station at Abu Kuka came alongside to inquire who we were. They had paddled eight hours down stream,—a distance that it might take us a week to perform. At 9 A.M. they returned to bring us some cordage, as ours was perfectly rotten and breaking hourly.

July 2nd.—Arrived at Abu Kuka, or Lolnun, and the elder Poncet gave us as hearty a welcome as the swamp he inhabited could afford. He had sent us his only towing-line, and the country affording no palm-trees no raw material was procurable. Under these circumstances to quit the boats and proceed by land was the only alternative; and Jickwi, the Kytch chief, promising porters with alacrity, I at once decided to proceed *viâ* the Aliâb to Gondokoro, or my station, as circumstances might dictate.

July 4th.—The doctor's boats and consort joined, and the donkeys were sent on to Adôr, some 12 miles' distance westward, where Poncet possessed a hunting-station. The chief Jickwi had promised porters to conduct us to the Aliâb from Adôr; but, on eliciting particulars, I found the payment was expected to consist of a cow

for each porter. The necessary cattle were to be obtained by a *razzia* on my part against the Aliâb, with whom the Kytch were at feud. The proposal was declined, and the upshot of a long conversation with Poncet and a palaver with Jickwi was, that I must proceed to the Rohl, some fifteen days' journey due west. At that place I could obtain porters for copper bracelets, and thence any desired number of negroes for the same commodity or beads, to my station, presumed due south. Poncet's principal station was at the Rohl; therefore, his statements seeming reliable, I decided to adopt the route, although a terrible roundabout way to Gondokoro. On the 8th of July a party of negroes were despatched with loads to Adôr.

July 11th.—Got out my gutta-percha punt, and, to the agreeable surprise of our men and some wondering negroes, I rowed Mrs. Petherick across the Nile.

July 17th.—Several heavy storms had considerably damaged our stores, and quantities were thrown overboard.

July 18th.—Bright morning; thunderstorm and drenching rain at noon. At 3 P.M. sent off another lot of forty-five porters.

To Surkatti, under orders for Gondokoro to await us and support Captains Speke and Grant in case of their arrival, was given the dispensable cordage from the standing rigging of three boats, (which were to return down river) to serve for towing-lines to conduct him to the Shyr. At that place raw material was known to exist sufficient for the manufacture of any amount of cordage he might require for his necessities till he reached Gondokoro.

Preparations were completed by July 25th, and his boat laden deep with stores, the liberated children, and a guard of twelve men, Surkatti, with the good wishes of all, spread his sails to a favouring breeze.

July 27th.—Jickwi and the porters became exacting, and, in lieu of a pair of copper ear-rings or a bracelet, a cow for each porter was insisted on. "If I was to rob any one, I would sack his house and village for breach of contract; and I could forego the goods already forwarded to Adôr, if unable to proceed thither in person." The argument was conclusive, and in the afternoon Mussaad, with an escort, accompanied a party of laden porters to Adôr.

Khartûm, Dec. 20, 1863.

The above and my accounts—the latter drawn up by Dr. Murie, kept in a tin box, and placed for greater security in one of the huts, adopted as a storehouse—unfortunately, by mistake, was taken by Mussaad to the Adôr.

The boats were reduced to the smallest possible allowance of

grain for their return voyage to Khartûm, and it was beyond my power to detain them in order to await our arrival at Adôr and the return of the documents. Therefore, owing to prolonged and tedious illness, terminating with Guinea worm in the right foot, I am now only enabled at intervals of short durations of strength, by the exertion of all my efforts and the sacrifice of official and other correspondence, to continue my Report.

To proceed with my Journal. I was occupied on the 29th July with final preparations for the return of the boats and our journey inland. Everything was prepared for leaving by the next day. Means were taken to provide a reinforcement of men and additional stores, with the despatch of the boats from Khartûm to Gondokoro, as early as possible in the approaching season.

July 31st.—The negroes having disappointed us, we set out alone at noon with a small party only of our men, who by this time had become familiar with the route. The Doctor and Foxcroft were left to bring up the last loads, for which we hoped to send the required porters from Adôr. The boats also were about to leave their moorings for Khartûm, and with heavy hearts their crews took anxious leave of us.

We proceeded on horseback through slush and marsh, and over water in our punt. We passed the night in a kraal. The greater part of the cattle lay in water, and to all intents and purposes, like their masters, they had become amphibious.

August 1st.—A continuation of marsh to the precincts of Adôr, where we found our tents pitched outside the station. Jickwi and our active agent, failing to procure porters at any price short of cattle to be stolen from the Aliâb, had, to lose no time, at quadrupled rate of copper bracelets, hired twenty negroes to proceed with sixteen laden donkeys, supported by an escort of twenty-seven men, under an old hand, to the Rohl, some sixteen days' march due west. From this date our Day-book was regularly kept; and as I forward it for your inspection, I need now but touch upon the principal events of our journey, which therein may not be sufficiently explained.

Aug. 11th.—Notwithstanding the endeavours of Deradan, chief of the village, Jickwi's brother, we could not obtain sufficient porters for even the most indispensable of our requirements. Therefore, on the 15th of August, we were constrained to leave 150 loads behind. Left Adôr with forty porters, eighteen laden donkeys, six trained bullocks, and several head of cattle, purchased at 15s. a-head for our requirements on the road.

Aug. 19th.—At 3 P.M. we arrived at some fishermen's huts, forming

a hamlet, called Jemeed, on the bank of an apparently boundless lagoon, called Faragan, conducting to the river Hangan; supplied by streams from the south, and discharging itself into the Nile at the northern extremity of Gaba Shambyl, in the territory of Fouaer. The lagoon divides the Kytch on the east from the Atwat and Rohl on the west. After the rains the waters subside into two or three channels, and the land affords coarse but abundant pasturage.

Aug. 22nd.—The fishermen of the hamlet, who yesterday had contracted for thirty canoes to ferry us across the lagoon, during the night have decamped with bag, baggage, and canoes.

Aug. 25th.—At 7.25 P.M. saw a comet, and observed distances—from Benetnasch, in Ursa Major, $10^{\circ} 3'$; Ras Alhague, in Ophiuchi, $30^{\circ} 53'$; and Alpheta, in Coronæ Borealis, $25^{\circ} 44'$.

Aug. 28th.—The negroes of the adjoining village of Neot harbouring the fishermen, and refusing to barter grain or food of any description, we were obliged to occupy the village, and, in the event of a protracted refusal to ferry us over, were determined to subsist on their ripening grain until the drying up of the lagoon. The huts, at considerable distances from each other, were being abandoned, and the high corn dividing them was resorted to by the negroes, to all appearance bent on attacking us. Flanking our porters, we marched to about the centre of the village without opposition; and, taking possession of a deserted set of huts in an enclosure for the deposit of our traps, our tent was pitched outside. High stages, used by the negroes as look-outs, were occupied by our sentinels. After a short palaver with a few of the natives, and a repetition of our requirements and intentions, canoes were promised on the following day.

A heavy shower of rain followed; and when about to cease, in lieu of the expected fishermen, we were astonished by flights of arrows, discharged by the negroes in the belief, as we afterwards discovered, that the rain would prevent the discharge of our firearms. Several shots from our wary men told a different tale; and hurrying, rifle in hand, to a stage to show them the effect of our arms, and daunt them at the least possible expense of life, at 300 yards I picked off a leader backed by a strong party.

The man was no sooner down than his men relieved him of his bow and arrows, and fled. Our attendant, Ringa, true to Nyam Nyam habits, administered the *coup de grace* in the head. I was sorry for it, and would have preferred having him a prisoner. His wife and son, a boy, fell into our hands. Four or five others had fallen; and, finding their bows and arrows took no effect, the affair terminated.

Aug. 29th.—Three negroes presented themselves, and peace was offered and accepted. To ratify it, the next day, a white bullock was slaughtered, and ourselves, but particularly the tent, were elaborately sprinkled with water. Fishermen and canoes were promised to convey us on our way.

Aug. 31st.—A heavy storm and abundance of rain; our tent was inundated; negroes did not show themselves.

September 3rd.—Seventeen canoes in waiting, we returned to our old quarters at Jemeed. At noon the canoes were laden, and sent on to a deserted kraal farther south, to which we followed in our punt on the next day. We had scarcely time to pitch our tent when a heavy storm inundated our baggage.

Sept. 5th.—The canoes, with a guard of ten men, heavily laden with the greatest part of our stores, at 9 A.M. left to cross the lagoon, and return for the remainder.

Sept. 6th.—Some firing heard in the direction of Jemeed was inexplicable; and, at 7 A.M., twenty-one of our men, with forty porters, on their way back from the Rohl, came marching gaily up with colours flying. They had successfully crossed the lagoon the day previous; had seen nothing of our party of ten men and baggage; and, ignorant of our presence, had dismissed their canoes. They were on their way back to Adôr to fetch some of the remaining stores.

At 10 A.M. two shots were faintly heard across the lagoon, and we fancied they might proceed from our men, perhaps returning with the canoes. The day passed without intelligence of them, and suspicions were entertained that all was not right.

The return men from the Rohl, on their upward journey, had been deserted by the fishermen after having ferried over their goods only; and the greater part of the men, at the risk of their lives, had to swim and wade alternately during an entire day to cross the water. Their porters, with the sole exception of the chief, Jickwi, took advantage of their opportunity and deserted. Reduced to their donkeys, they were obliged to advance short stages, and return for the remaining loads; thus they accomplished a weary journey to the Rohl, compelled to traverse the same ground twice over.

Sept. 7th.—Despatched, at 8 A.M., seven men and an interpreter—Cheir Allah—in the punt across the lagoon to look out for the advance party; proceed with them to Atwat, and endeavour to procure canoes.

At 5 P.M. five canoes were announced; they turned out to be our own men, who had left us with the seventeen canoes laden with

goods on the 5th. They had evidently been roughly handled—vouched for by bruised faces, cut heads, and swollen arms. The negroes had, in fact, betrayed them by upsetting, at a given signal, the canoes. The unfortunate men, struggling in deep water, were mercilessly clubbed on their heads, faces, and arms, held up to protect themselves; and two of the party sank to rise no more. The loss of goods was sad and irreparable, comprising photographic lens and chemicals, arsenical soap, and flaying-instruments; the whole of our stock of beads, four elephant-rifles and muskets, a pair of tusks, trophies of Carlo; the doctor's, Foxcroft's, Carlo's, and the entire of the men's clothing, with other things too numerous to mention.

Fortunately two or three of the men retained their guns, and, notwithstanding the immersion, they did not fail them; and, killing as many negroes, the savages made off, leaving five canoes, bottom up, by means of which they returned to us. To add to our misfortunes, Mrs. Petherick was suffering from fever, myself with lumbago, and our men, of whom many were invalids, were straitened for provisions.

Sept. 8th.—Embarked eight men, with the few stores we had left, in the captured canoes, and, at 5 P.M., after a hard day's work, they returned, having landed the goods in a deserted kraal, and consigned them to Abd-el-Cheir and his party, who had yesterday crossed in the punt.

Sept. 9th.—Sent our porters, under an escort, across the water; and, as Mrs. Petherick was too ill to move, gave orders for them to proceed with the baggage to the Rohl, and to return as soon as possible for us. In the mean time I retained the men and porters thence, who had joined, on their way for more goods from Adôr.

Sept. 10th.—The canoes having returned, sent Mediné, an old servant, with a reinforcement, to join the men on the other side, and proceed with them to the Rohl, fearing lest a small force might come to grief.

Sept. 12th.—Returning from a morning ride, with some guinea-fowl, I was astounded to learn that our trusted agent, Mussaad, had been shot at, and killed instantly, by a youth of Moorish descent, in a quarrel. The lad was sitting some 50 yards off, in the expectation of a similar fate; but I handcuffed him instead.

Sept. 17th.—Mrs. Petherick, feeling herself equal to the task, although very weak, begged to leave the unwholesome spot; and, accordingly, we embarked our remaining baggage in the canoes, and, with astronomical instruments and our firearms, we entered the punt. Crossing the Hangan, we had navigated a narrow channel,

in the reeds, about a mile, and got into a strong current joining the central channel. Their united streams, called Ameen, flowed north, and formed a stream about 30 yards wide and 16 to 18 feet deep. We then passed into shallow water, from 1 to 3 feet deep, amongst high grass and reeds, with occasional open spaces of clear water.

The dense wood seen on the horizon from our camp on the Hangan was now but a short distance from us, and it also was inundated. Ant-hills became conspicuous, and we disembarked on one, whence our effects were carried by the porters to a deserted kraal, called Abael, and the canoes returned for the doctor and the rear. Thus the Lagoon was virtually passed; but although we were now on a spot of dry ground, the entire country as far as the eye could reach was inundated.

Hence through the Atwat territory we waded full three-fourths of the way to the Rohl, and at noon, Sept. 22nd, we reached the long-talked of Poncet station, near the village of Adael. The station consisted of an extensive stockade: the outer one was allotted to the cattle, and in the inner one, containing some seventy huts, we were allotted three thereof for our accommodation.

Sept. 26th to 28th.—The ways and means for further progress having been proposed, and my plans frustrated as much as possible by the agent of the station, to whom I had delivered a letter concerning us from his employer, my presentiments, gleaned *en route* from the men, at length were beyond a doubt confirmed, that without cattle I could not move.

What the intentions of Poncet and his agent at Adôr were, to mislead me by representing the Rohl as a bead-trafficking community, I could not imagine, as even the ordinary articles of consumption, such as moderate quantities of grain, honey, and tobacco, could only be obtained in exchange for a cow or calf. Had I chosen to rob cattle in order to pay the porters, I could have done so at the Adôr, and avoided all the inconveniences and heavy losses that had befallen us by following this impracticable and circuitous route. What was to be done? Indebted to the amount of some sixty head of cattle for the hire of the porters who had accompanied our men, whom we met on the Lagoon, the agent, for an equivalent of goods or money, could or would not supply me with any more cattle. Neither would the negroes of the adjoining village dispose of any of their cattle for any consideration in our power to give them. The men's demands for cattle to purchase their different requirements, put off from day to day, rendered them troublesome and turbulent. They told me we could neither return nor proceed, and they would consent no

longer to privations, whilst in possession of the means to obtain them, and, with or without my consent, they were prepared to join Poncet's men in a razzia.

The storm I had long foreseen brewing now burst, and, as matters would be only aggravated by a refusal, I gave my reluctant consent. Our reflections, as may be supposed, were none of the pleasantest. In lieu of the introduction of more valuable and civilising merchandise, such as cutlery, or cloth for wearing apparel, as articles of barter, of which the negroes are very fond—when the value of glass beads and copper ornaments began to decline and to lose their charm—the traders disgraced themselves by descending to the level of the savages, and imitated them, on a larger scale, in their attempts to enrich themselves by the plunder and destruction of tribe after tribe. From this to slave-stealing, and the pursuit of the traffic, was but a step, which, according to my experience, all the traders have learned, more or less, to indulge in. With the produce they pay their men, and realise such profits, that to many, I believe, the ivory trade is but of secondary consideration.

Oct. 22nd.—A commotion in the village. Some cattle have been stolen by the natives from the Atwat, and traced to Adael; several women and children have been seized in the corn-fields, to be retained as hostages for the stolen cattle.

Oct. 30th.—Our marauders returned, and after the deduction of one-third for the men, as I was informed was usual, we possessed sufficient cattle for all of our requirements. The only casualty was the loss of one man, in an elephant hunt.

November 13th.—At length the arrangements had been completed, and with one hundred porters for ourselves and fifty for a detachment of Poncet's men, we left the station to proceed due south. Poncet's agent and fifty of his men accompanied us to bring back the negroes to their homes, as, if left to themselves, they would risk being exterminated by the tribes.

Nov. 14th.—Crossing a sheet of water, we suffered some inconvenience by the desertion of a number of our porters, and the loss of some loads, which, thrown into the high grass or water, could not be recovered.

Passing subsequently through the Djour territory, and entering that of Moro on the 30th November, we made Neangara, the village of a chief of that name, who ruled over a district called Moro Morokodo. The country traversed gained in elevation, and we were now enjoying the prospect of several hills. The Rohl porters, as also Poncet's agent, would proceed no farther; and as the aborigines would not carry loads, we were obliged to wait here until porters

could be obtained from my station, situated at some eight or ten days' journey farther south.

December 2nd.—One-half of our men left for the required porters. Illness prevailed to a great extent amongst us, and, in particular, my dauntless wife and myself were great sufferers. Neangara and the natives were well behaved, and paid us great attention: many of our men were known to them by name, having been here on former trading expeditions from the station.

Dec. 15th.—Our agent Awat arrived from the station with a numerous escort, and brought us upwards of one hundred porters; but I was too ill to think of moving for some time to come.

Dec. 16th.—Awat, having some months previously left merchandise for barter with several Nyam Nyam chiefs, about four days' journey westwards, proceeded with some hunters, thirty men, and all the porters to Makraka, a Nyam Nyam district. Provisions there were abundant, whilst Neangara could with difficulty supply us with a sufficiency.

January 12th, 1863.—Awat and his men, with about 10 cwt. of tusks, opportunely arriving, were gladly welcomed.

Jan. 17th.—Arrangements being complete, and we convalescent, left Neangara, and, travelling through an undulating and prettily-wooded country, occasionally intersected by brooks, we crossed in our punt a considerable and highly picturesque river, called Ayee. Its course was 10° (azimuth compass), and its breadth about 100 yards. The depth varied from knee to waist, and it was reported to contribute its waters to the Hangan, of which lagoon I believe it to be perhaps the principal feeder.

Jan. 25th.—After crossing another pretty stream, the Bibio, we arrived at my station, situated near the junction of the Bibio and the Ayee, formerly known by the name of Neambara, but really situated, not in that district, but near the village of Wayo, in the Moro territory. Our donkeys, originally forty, had now dwindled to fifteen, and I lost my horse.

February 12th.—Having waited for a change of porters, we proceeded easterly, *vid* the Neambara, through a romantic group of hills, compared by our doctor to the Trosachs, the drainage of which, the river Queeny, flowed north, and emptied its waters also, it was said, into the lagoon of Hangan.

Feb. 16th.—A vast plain, inhabited by the Bari, was reached. Sixty men, a reinforcement from Khartûm, were met, who with four boats had arrived at Gondokoro. The men were bent upon searching for us, and conveyed the unpleasant news of the rumour of our deaths, as also a letter from Mr. Baker, dated Gondokoro.

The various sluggish, and now for the most part dried up, water-courses which traverse the well wooded and fertile plains, take an easterly direction, and finally discharge themselves into the Nile below Gondokoro.

Feb. 20th.—Arrived at Gondokoro, and to our agreeable surprise were greeted by Captains Speke and Grant, as also by Mr. Baker—the former having preceded us by five days. We were glad to find that Captain Speke, on his arrival, had availed himself of our stores for the clothing and support of his men; but an unfortunate misunderstanding, to which I will not here allude, having arisen, with the exception of a daily allowance of grain for his men until the date of his departure, he would, unless for payment, accept of no further stores or provisions.

The *Kathleen*, our dahabyeh, hitherto occupied by Captain Speke, as also four other boats, one of which, Surkatti's, had reached Gondokoro some months previously, were, one and all, forthwith declined. Thus terminated an expedition, as unpleasant as it was arduous, and for the execution of which I had exhausted our means and energy.

In consequence of having performed my official duties in opposition to the slave-trade, and the interests of large bodies of men assembled at Gondokoro, a revolutionary spirit was communicated to my men. Insubordinate during their inebriation, the daily discharge of firearms in near proximity of our boat, when seated on its deck, and abundant whizzing projectiles, gave ample warning of the danger to which we were exposed.

Our intention of proceeding to the cataracts, and thence on the western side of the Nile in search of the lake cited by Captain Speke, and previously reported by our agent Mussaad, was frustrated; for out of the 200 men, exclusive of sailors, who were with me, only 15 declared themselves willing to follow me. Fifty-four of them seized a boat and proceeded to Khartûm direct; whilst others, according to their pleasure, either went to my establishment or consented to visit the Sobat, on their way home. Under these circumstances I proposed joining our residue with a like number of men who also consented to follow Mr. Baker, and jointly to undertake the journey; but no sooner was the proposal made known than the men of the latter stoutly refused to move, if in my company. There was no alternative but to return; consequently on the 28th of March we left Gondokoro in the *Kathleen* with a consort, attended by fifteen men, and proceeding down stream, I was fortunate, during occasional convalescence, in being enabled to measure the volume of water which the Nile and its principal tributaries conveyed per second.

For the particulars of measurements, you will please to refer to the Day-book.*

* *Volume of Water, White River above Junction with Bahr-el-Ghazal*
(April 25, 1863).

Rate of Current above Junction—1 knot per hour = $23\frac{1}{4}$ feet per second.

Width of Stream above Junction—223 feet 6 inches.

Different depths of River from East to West bank at nearly equal distances,
viz.—

	Fm.	ft.	in.
	1	3	0
	4	0	0
223 ft. 6 in. \times $22\frac{1}{2}$ ft. \times $23\frac{1}{4}$ ft. \div 14 seconds = 8288 cubic ft. per sec.	5	0	0
	4	5	0
	4	4	0
	4	1	0
	3	2	0
	1	3	0
	8	29	4 0

Mean depth in fathoms 3 4 3

Volume of Water supplied by Bahr-el-Ghazal (April 25, 1863).

Rate of Current below Junction = 1 knot per hour = $23\frac{1}{4}$ feet per second.

Width of Stream below Junction 480 feet 9 inches.

Different depths from East to West bank, viz.:—

	Fm.	ft.	in.
	1	3	0
	1	4	0
	3	1	0
480 ft. 9 in. \times 14 ft. 10 in. \times $23\frac{1}{4}$ \div 14 secs. = 11,330 cub. ft. per sec.	2	4	6
Deduct volume of Water above Junction .. 8,288	3	1	0
	3	1	2
Volume of Water supplied by Ghazal 3,042 $\frac{1}{2}$ cub. ft. per sec.	3	1	2
	3	0	0
	2	0	8
	1	4	6
	9	22	1 10

Mean depth below Junction, in fathoms 2 2 10 $\frac{1}{2}$

Volume of Water supplied by Sobat (June 6th, 1863).

Rate of Current—16 feet 3 inches in 14 seconds.

Width of River—309 feet 3 inches.

Different depths of River at nearly equal distances, viz.:—

	Fm.	ft.	in.
	1	2	0
	2	3	6
309 ft. 3 in. \times 24 ft. \times 16 ft. 3 in. \div 14 = 8615 cubic ft. per second	4	2	6
	5	3	0
	6	1	0
	5	1	0
	4	3	6
	3	5	6
	2	2	6
	9	36	0 6

Mean depth of River, half a mile above Junction 4 0 0

The results are as follows, viz. :—

								Feet.
Below-junction of Bahr-el-Ghazal ..	..	..	..	..	..	..	..	11,330
Above ditto ..	..	..	..	..	..	..	..	8,288
Volume of water of Bahr-el-Ghazal ..	..	..	..	..	..	..	..	3,042
Volume of water of Sobat ..	..	..	..	..	..	..	..	8,615

Of the second Sobat I regret my inability to supply the measurement, never having heard of its existence except in the imagination of Captain Speke.

I had hoped to have been enabled to furnish the volume of water conveyed by the Blue Nile; but serious illness since my return to Khartûm has prevented it, and it is now too late to convey any approximate idea of it in connexion with the above.

The accounts of my expedition, daily journal, sketch-map, and astronomical observations, accompany this my Report, for your inspection. My collections of objects of natural history have been forwarded to the British Museum; and the botanical collection, commenced at Korosko and prosecuted during our entire journey, was consigned to my friend Captain Grant, for presentation to the Kew Gardens.

It remains for me to state, that on our return down the Nile we visited the Bahr-el-Ghazal. The greater part thereof, owing to the shallow state of water, was found overgrown with reeds and "ambadj" (*Ademone mirabilis*), and two days prior to our arrival, at our old moorings, the island of Kyt, the navigation was through a narrow putrid ditch, so encumbered with papyrus plants and ambadj, that the *Kathleen* bears the marks of their inconvenient proximity.

I have the honour to be, Sir,

Your most humble servant,

JOHN PETHERICK.

The astronomical observations alluded to in the foregoing Report, with the Map, will be included, as before stated, in Mr. Petherick's details of his land journey to be published in the 34th volume of the 'Journal.' The following is his statement of account of his expedition :—

Dr.

Mr. PETHERICK'S STATEMENT OF ACCOUNT of his Expedition.

Cr.

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PETHERICK'S FINANCIAL ACCOUNT.

[APRIL 25, 1864.]

JOHN PETHERICK,

E. E.

Khartûm, Jan. 16th, 1864.

1861.	To subscribed by the Royal Geographical Society	Egypt. Pra	at	£. s. d.	1861. Nov. 15 1862. March 20	By Expenditure of Abd-el-Majid	Current Pra.	at	£. s. d.
Nov. 15	One-half Expenses of Abd-el-Majid, on account of my establishment .. .. .	..	..	1000 0 0	1861. Nov. 15	Personal Expenditure	107,383	115	933 15 4
May 25	Sundry Goods sent to my station at the Djour Bahr-el-Ghazal .. .. .	..	..	466 17 8	1862. March 20	Sundry disbursements, viz. :— Balance of Pay and Boat-hire Advance to men and sailors to reinforce the Expedition at Gondokoro Stores, Provisions, per McInulf Allan Balance of Pay and Boat-hire on return of Expedition	607,096 Egypt. Pra. 31,498 35,432 86,121 56,764	..	5279 1 10
1863. March 10	Ditto sent to Sobat per Bayooda	13,943 30	..	..	June to Sept. Nov.	..	..	..	..
" 20	Realised by sale of Punt Gun, and sundry Goods at Gondokoro	6,972 0	..	..	1863. June 15	..	..	..	..
" 25	Goods sent to Sobat per Ali Diab	25,476 0	..	..	..	..	..	..	..
April 8	Ditto consigned to Mohammed Ali for transport to my station in Makraka	3,200 0	..	..	..	..	..	..	..
May 7	Hire of Jimnad Tamra's Boat and payment of Crew for the requirements of my station	89,779 0	..	..	..	..	..	..	..
" 22	Goods consigned to Mohammed Kunna at Shyr	6,175 0	..	..	..	..	..	..	..
June 15	Gutta-percha Punt and Sundries to Madame l'inné	1,295 0	..	..	..	..	..	..	..
	Rifles and Sundries	11,882 0	..	..	..	..	..	..	..
	Goods consigned to my agent at Djour	17,940 0	..	..	..	..	..	..	..
	Valuation of Goods returned to Stores at Khartûm, viz. :— Firearms 44,846 Beads, 30 crs., at 2s. 6,000 4 crs. Copper Bolts 4,000 2 " Bracelets 2,520 Sundries 2,500	4,450 0	..	..	..	..	..	..	..
	Realised by Tusks obtained on Expedition, 10 crs., at 16l.	59,868 0	97½	2471 11 4	..	..	..	..	..
" 25	Balance	240,378 0	..	160 0 0	..	..	..	..	..
		..	..	4098 9 0	..	..	..	..	..
		..	..	4286 17 4	..	..	..	..	..
		..	2	8385 6 4	..	..	..	2	8385 6 4

The letter of Mrs. Petherick is as follows :—

*Khartûm, Soudan, Africa,
July 26, 1863.*

SIR,—My husband, Mr. Consul Petherick, is very ill, and in the absence of any one who might render him this service, I beg you to accept a letter from me. I feel sure that you will not deem it out of place, and I also believe that you will extend your warmest sympathy to Mr. Petherick. We have now been at Khartûm six weeks: the day of arrival we were unable to land, so impaired was our health. I am slowly recovering, but Mr. Petherick is much worse; he is completely prostrated, and utterly incapable of attending to business in any shape. I do not feel justified at present to send you the accounts of Consul Petherick's disbursement of the 950*l.* subscribed for his expedition under the auspices of the Royal Geographical Society, though they have been ready many months. There are also the solar and lunar observations, the days' work of travel in the interior, the map of route, and the sketch too of the southwards one, taken by our Agent early in 1862 in search of Captains Speke and Grant. Should my poor husband continue thus seriously ill, I will make my best endeavour to forward you the papers alluded to.

You will soon hear in detail the many trials that we have endured, and all, alas! to be of no avail; we rest alone upon the consciousness of having done our best, using incredible efforts to reach Gondokoro. On the 1st of August, 1862, we were compelled to abandon the boats, in consequence of their leaky condition. The cordage was rotten from constant immersion and three months' towing, so that there remained not a chance of reaching Gondokoro by river. The place of disembarkation, on the commencement of our overland journey, was a wretched swamp, a few patches of ground alone being visible, on which tookuls had been built, and formed a temporary station belonging to the brothers Poncet, from whence the ivory brought from inland was shipped. The station is known to the Arabs as Abu Kuka, but by the negroes it is called Lohun.

Three boats returned to Khartûm, whilst another proceeded to Gondokoro, laden with the little grain saved from the quantity damaged by leakage and rain. Several invalids went in her, a few soldiers, and a number of slaves, whom Mr. Petherick had rescued from one of his agents, and was now able to send on to their relatives. It was a joy to hear, upon our arrival at Gondokoro, that their freedom had been accomplished, and their friends crowded to the Consul to give thanks. We were to push on by land, and the route that it was at first proposed we should take was through the countries of the Aliâb, Madar, Shyr, and the Bari. This was the direct way south: the negro porters, however, refused to carry our baggage, unless Mr. Petherick fought the Aliâb and seized their cattle, which was to be given to the negroes in lieu of copper as hire. The tribe who thus made proposals was the Kytch; they were infuriated because the Aliâb had stolen enormous herds of their cattle some time previously. Mr. Petherick not consenting to their request, his only alternative was to proceed westwards to Gondokoro by an indirect and untravelled route. The country that we were to traverse, as far as Mr. Poncet by report had knowledge of it, to his third station, the Rohl or Adael, was a bead-trading one, and this Petherick felt to be of great advantage.

The negroes willingly carried, each for a pair of copper earrings, our loads to Poncet's second station, Ador, one day's journey from the river. The *Lady of the Nile* sailed for Khartûm a few hours after our disembarkation, and upon her arrival at that port, went down, damaging goods saved from former misfortunes, also papers, &c. A party of our soldiers went a day in advance of us; they had with them sixty porters, and were accompanied by the Chief Jickwi; they were bound for the Rohl station, a distance to be accomplished

under favourable circumstances within three weeks: the porters were paid in advance with massive copper bracelets. We reached Ador on the 2nd August, starting at noon the day before, the crossing of the lagoon and the heavy rain having prevented us from doing the march in the course of the day. When there every effort was made to leave Ador with another large party as soon as possible, but the negroes believing that to a certain extent we were in their power, as our boats had left, refused to carry unless paid with cattle. Remonstrances were of no avail, and they were even offered four times the amount of copper accepted by their comrades.

A fortnight was wasted in endeavouring to bring them to reason; the chief's wife, after remonstrating in vain with them, said to Mr. Petherick, "If you remain here with all these men we shall not be able to supply you with grain, and without porters you cannot leave. My people are thick-headed and obstinate, and will not listen to my words; you must therefore seize them and force them to carry your loads. I will bring you a few, chiefly women; pay them what you have promised."

No time was lost: the chief's wife directing our men where to search, several able-bodied negroes were secured, and the following day, August 15th, we started, but were compelled to leave a hundred loads behind, and we travelled without even the comfort of tea or sugar; every luxury was dispensed with. A week brought us to the great lagoon; we were here attacked by the negroes, who wanted us to return, and we could get no canoes for a length of time. At last, by persuasion, backed with threats, the canoes were brought, and half our force embarked with the merchandise and a great quantity of powder. Where the current was strongest (the meeting of two rivers) the negroes upset the canoes, and clubbed our men as they rose to the surface; but the men, rendered desperate, fired, though the guns had been immersed. Two went off, killing a negro and wounding another, when these negroes, panic stricken, seeing the effect, and finding their calculation wrong as to the utter uselessness of firearms when wetted, made off, leaving five of the sixteen canoes on the water. Two of our best men were murdered, and the property was lost. Amongst it was the fine photographic apparatus brought out from London.

I have no time to dwell upon the difficulty we now experienced to get on, but the lagoon was crossed; not however without the loss of life; and we reached the Rohl at the end of September, where we found the men who had preceded us. They had been shamefully used: the sixty porters ran away when they reached the lagoon, the chief alone remaining with them; and the men of the canoes left our people in the centre of the lagoon on a very small island; they too had been paid in advance. The soldiers had then to get on as they could: it fortunately happened that they had donkeys, and were thus able to convey the luggage. Dividing their party, one body went a march in advance, depositing the loads and returning for the remainder; their journey was thus doubly tedious, and they had reached the Rohl only a short time before we did.

At that place we were detained two months. The negroes would not listen to any proposition for hire but that of cattle, which Petherick refused to give. During this wearisome stay, the men of the zariba, anxious to go upon a cattle razzia, a system to which they were often compelled to resort, as the negroes refused to barter unless for cattle, induced our men to solicit permission to accompany them. Their request was passionately refused by Petherick, when, to our dismay, the men said that they would go; that Petherick had no right to keep them there to starve, and they refused service. Our position was anything but pleasant; and the men of the station, headed by the agent, insinuated that we could no longer remain there. We were in debt to them sixty head of cattle, which we had borrowed for necessary expenses: cattle invariably was taken for payment; without salt for a considerable time, a small lump was offered for sale—the price, a cow; and again, during a severe attack of

fever, which prostrated me, I had asked for a little honey, and a cow was charged for it. Spirit was distilled at the station, and our men had gone deeply into debt for it; so all these circumstances formed a combination too strong to resist, and, reluctantly, a consent was wrung from Petherick that his men might go with the others on the razzia. They returned with cattle, porters were speedily procured, our debts paid, and we left in November the Rohl, for a place called the Neangara, a settlement south of the Moro tribe; our porters would not accompany us beyond, as the tribes were hostile. Arrived there we were distant but a week's quick journey from Petherick's station of the Neambara, and thither we sent for porters to convey us on. The Consul was here attacked with severe illness, and for a month he was perfectly helpless. His horse died when we were there detained, so that when our journey was continued he had to ride a donkey. There were but ten of those animals left of the forty which we brought from Khartûm.

In January, 1863, we arrived at our own beautifully situated station, the Neambara. We here remained only a fortnight. It was necessary to hire fresh porters, and for this troublesome land it may be considered fortunate that they were in that time forthcoming.

The journey from the Neambara to Gondokoro was truly pleasant. The country was high and fertile—a great change from the marsh lands—our health became re-established, and we arrived at Gondokoro in good spirits, there to meet with Captains Speke and Grant. Mr. Baker with boats and a good force from Khartûm was also there; from him Captain Speke had already accepted the use of his dahabyeh on its return to Khartûm; also stores from him, though our dahabyeh, with three other boats laden with stores, were at Gondokoro, and placed at Captain Speke's disposal, but he rejected any aid from Mr. Consul Petherick.

It had been arranged that Mr. Baker should proceed in the direction of a large lake reported to Captain Speke, but which he had been unable to visit, Captain Speke giving the necessary directions for the guidance of Mr. Baker. And thus it seemed that there was no opening for Mr. Petherick, yet he determined to push on towards the said lake, though in a different direction from that to be pursued by Mr. Baker.

In a few days Captains Speke and Grant sailed for Khartûm, carrying with them our letters, the first we had an opportunity of sending for many weary months. These brave and successful travellers had hardly left Gondokoro when Mr. Baker's men mutinied and refused to proceed inland, a few only remaining faithful. Our men rebelled at the same time, and declined to serve Petherick any longer. Sixty-three of these renegades insisted upon being sent back in the boats to Khartûm, and this request, if denied, they said they would enforce. The feeling against Petherick was very violent, and his life was in hourly danger. All this was owing to his attempt to suppress slave traffic; he acting according to orders received from his Government, and having exposed the system universally adopted, traders and soldiers were vindictive—indeed they had sworn to take away his life. Some fifteen men remained true to us, but these included our personal attendants. Mr. Baker's reduced force numbered about the same, and, placed in this dilemma, it was proposed that the two small bands should become one, and that at once we should start towards the lake reported by Captain Speke. But again a difficulty arose: Mr. Baker's men refused to proceed if accompanied by the Consul. We were isolated. Mr. Baker, with his few soldiers, joined a strong party belonging to a trader who were returning to their station, some five marches eastwards of Gondokoro. For us there was nothing left but to return to Khartûm, with the enormous supply of stores which had been brought up by the boats a few weeks previously.

The greater part of the stores which we brought last year from Khartûm

were destroyed by the rains and leakage. The losses have indeed been serious; and the expenditure which Mr. Petherick lavished upon the Expedition from his private means tends well nigh to ruin him; and there is no longer legitimate trade; its existence, once flourishing, will become a tradition.

We left Gondokoro on March 28th, intending to proceed to the Bahr-el-Ghazal, and, on our return, visit and survey the Sobat: we had hoped that the river-voyage and tranquillity might restore health. Progress down stream was very tedious, going only with the current and sweeps; the wind was generally northerly, and so strong that the dahabyeh was almost daily made fast to the reeds until the storm passed, and then down came the rain. Had those capricious winds but served us at the same season the year before, how much unhappiness might have been spared us!

At the lake we had the pleasure of meeting Madame la Baronne, Madame Tinné, and her daughter; they were about to proceed to the station of a trader, and pass there the rainy season; from thence to go to the Nyam Nyams. But they, like all other travellers in this land of vexatious delays, were constantly retarded, and the rains had already commenced when they set off, and without the protection of the two gentlemen who were of their party, the Baron d'A—— and Herr von Heuglin: the latter was too ill to travel, and the Baron was compelled to await the arrival of porters. The ladies, with a numerous suite, got well over the first day's march, but then rain fell as it only does in the tropics; tents were blown down, and speedily the young lady was attacked by fever, and for many days was too ill to travel. The delay caused the diminution of grain, which was sufficient to have lasted until the station for which they were bound was reached. In consequence of this unforeseen difficulty the porters revolted, the soldiers threw down their arms, and were on the point of abandoning those they had come to protect. Fortunately at this time grain was brought into camp: the trader knowing that the delay would cause the consumption of the supply, thoughtfully sent some, and then peace was restored. The Baron hearing of this disaster, started immediately to render assistance, and subsequently Herr von Heuglin was carried in a litter to the rendezvous. Since our arrival at Khartûm we have heard that the adventurous ladies are well and comfortably settled, and that they have received an invitation from a Sultan of the Nyam Nyams to visit him.

The Bahr-el-Ghazal is now a vast swamp, and it is with the utmost difficulty that a passage can be forced through reeds and the pithy ambadj-tree, which has encroached everywhere. The steamer hired by Madame Tinné had the paddle taken off ere it could be attempted. The place is most unhealthy; and we, attacked by typhus fever, were compelled to make a hurried retreat. Arrived at the Sobat, it was discovered that we were almost without grain, and none could be purchased, so that we went on to Khartûm. Here everything is in disorder, and the report of our death, so universally believed, has caused us great vexation. We are cut off from all knowledge of home news; my last letters bear date October, 1862, and the anxiety for tidings tends to aggravate the fever from which I daily suffer, and you must permit me to offer that weakness as an excuse for the very disorderly written letter which I now send. It has been a trial to complete it, and I have been several days about it, often able only to pen a few lines, and I now feel how imperfect it is. I hasten to conclude, as the post leaves to-day. I wish I could give you a better account of my good husband's health, and, trusting fervently that shortly it may be in his power to write to you, I beg to remain, sincerely yours,

Khartûm, Aug. 3, 1863.

KATHERINE PETHERICK.

TO SIR RODERICK MURCHISON.

P.S.—I find upon re-reading this letter that I have omitted to tell you that Mr. Baker did not proceed inland with the men and Jakeel of Laliffes, who brought down Captains Speke and Grant, as was arranged. Universally the men protested upon taking *Englishmen* to their locality; and thus it was that Mr. Baker joined a party returning to their station eastwards of Gondokoro, belonging to a Circassian, Kurschid Aga. We heard of his safe arrival at that zariba, and at the same time of the disaster which befell the men of the neighbouring station of a Copt, of the name of Shnooda, who is American Consular Agent of this place: one hundred and twenty of a party of his men, accompanied by a number of Kurschid Aga's force, and two malcontents of Mr. Baker's, who within a few days had levanted, set off on a razzia. The company separated at the foot of a lofty mountain. Shnooda's men reached the summit, capturing the cattle, and seeing no negroes, they made a descent on the opposite side, when, in a gorge, a shower of rocks and stones was hurled upon the Arabs, and one hundred and five lost their lives, fifteen only of the party returning to tell the tale. Since I signed this letter we have received a letter from M. Tinné, who informs us that it was from Mr. Petherick's agent at the Bahr-el-Ghazal she received the timely supply of grain, and not from the agent of the zariba to which she was going. Herr von Heuglin had not joined them; he was, in consequence of illness, travelling very slowly.

K. P.

The PRESIDENT said the paragraph relating to the liberation of slaves had reference to a charge which he believed had been most unjustly brought against Mr. Petherick, that he gave encouragement to the slave-trade. It now appeared that the first operation he undertook in connexion with slavery was to handcuff the captain of the vessel trading in slaves, and to liberate the slaves. He need not remind the meeting that Mrs. Petherick had shared all her husband's difficulties. The touching letter to which he had alluded would be placed in the hands of the Secretary, for there are parts of it which ought to form a portion of the communications published in the *Proceedings of the Royal Geographical Society*. The spirit of enterprise and devotion with which Mrs. Petherick has followed the adventures of her husband are truly remarkable. In reference to the catastrophe, which no doubt originated the report that Mr. Petherick was drowned, the letter described exactly what occurred. The calculations and observations in Mr. Petherick's Paper were in the hands of the officers of the Society. Among the documents is a map of the country to the south of Gondokoro, executed in a rough manner by Abd-el-Majid, the man whom he sent forward and who brought back the information that he could not hear of Speke and Grant. Captain Speke himself intended to have been present, but he was in Paris, having been requested to wait upon the Emperor of the French in reference to explorations in the interior of Africa. He had sent a telegram to inform him that the Emperor of the French is very well disposed to encourage all explorations in the interior of Africa, and will be happy to co-operate with England in any efforts to determine the sources of the great rivers which flow from the interior of Africa.

Dr. MURRE, at the invitation of the President, gave some additional details of Mr. Petherick's expedition. Starting from Khartûm, at the junction of the Blue and the White Nile, the party were favoured with tolerably fair winds, and the boats went up merrily to Bahr-el-Ghazal. Here the winds, which had been coming from the north, carrying the boats up against the current, changed and came blowing from the south, so that they had both wind and current against them, and they had considerable difficulty in getting along. The country is marshy, which rendered towing impossible. Accordingly they determined to quit the river and make a détour to the west, to Mr. Petherick's station at Neam-bara, which is about 90 miles due west. After a series of

marches they reached the station, and then went round to Gondokoro. In the previous November Mr. Petherick had sent a party up the river to meet Captain Speke, and they reached Gondokoro in January, 1862. Mr. Petherick left Khartûm in March, 1862, and did not reach Gondokoro until February, 1863, the march round occupying as many months as it ought to have done weeks. They encountered many difficulties. Being unable to get porters to carry the baggage, they were obliged to wait at several stations until they could get men. The country on both sides of the Nile at Bahr-el-Ghazal consists of a series of marshes and lakes. On their way to Rohl they came to a winding river with a general course from south to north, almost parallel with the Nile itself. They found great difficulty in crossing, and it was here that many troubles occurred and the misfortune happened which had been mentioned. The boats which were sent forward to Gondokoro Dr. Murie believed had orders to remain there until either Captain Speke or Mr. Petherick should arrive. The chief Arab in command, Abd-el-Majid, went to the station at Neambara to the west, and from this point sent the men under Mussaad to the south. They made a march of sixteen days southwards, and when travelling would go at the rate of 10 or 12 miles a day. The country we passed through, as well as that described to the south, is gently undulating and covered with vast forests; very fruitful and healthy. The chief thing which troubled our men in their march were ulcers in the legs and feet, caused by the sharp grass cutting the skin. Fever is comparatively unknown in that part, and mosquitoes are few. Cotton, tobacco, and many other products, are common. Mussaad reported a piece of water, flowing to the west, but was uncertain whether it was a river or a lake. Dr. Barth, in his Travels, has stated that he had heard from the Arabs that so many days south there was a river flowing to the west. Whether this was the same or not remains to be determined. He would say one word with regard to Mr. Petherick and his expedition. The Geographical Society sent him out to succour Captain Speke. He was to send boats to Gondokoro, which were to remain there a certain time, and if Captain Speke did not come he was at liberty to withdraw. Mr. Petherick himself, Dr. Murie presumed, so understood his instructions, and did send boats to Gondokoro. Abd-el-Majid, however, seemed not to have followed what Dr. Murie understood were his instructions, for he left and was coming down the river when Mr. Petherick met him. With regard to slavery, he might state that the whole of that country of the Nile is in a perfect ferment on the subject. Mr. Petherick met his own men coming down the river with slaves. It is almost out of the power of any man to prevent it. You cannot tell what the Arabs are doing in the boats up the river, and when they come down they conceal the slaves in their boats and land them at a point where they are sent away; some in an easterly direction towards Abyssinia, some to the west, and some down to Egypt.

The PRESIDENT said he had received a letter from Mr. Colquhoun, the British Consul at Cairo, stating that he had received books and packets of letters from Mr. Petherick, which he would send home by the Southampton boat. He had not heard from Mr. Petherick since Captain Speke left Gondokoro, and he was in ignorance of his movements; but had gathered that his health and that of his wife were much broken. Mr. Colquhoun added that the consulate in the Soudan had been done away with for the present. As the trade with the Soudan became more important, it would be necessary to re-establish the consulate, but on a totally different footing. "It is a wretched country," continues the letter, "and will need, what I fear it will not receive for some time, a thorough re-organisation. The slave-trade demoralises every one apparently who sets foot in it." In reference to this communication the President said he hoped, if through any misrepresentations Mr. Petherick had lost his appointment, that he would be re-instated. This was the first time that we had been enabled to do justice to him, for until now we had never had the real details of his expedition. The documents, on which geographers most rely, are in the hands of

the Secretary, and will be examined; and we shall see how they will enable practical geographers to improve their maps of a portion of Africa where no accurate maps have hitherto been made.

The second Paper was—

2. *On Fossil Bones from the Alluvial Strata of the Zambesi Delta.*

By JOHN KIRK, M.D.

THESE bones were collected in the bed of a stream which joins the Zambesi near the head of the Delta, whither they had been transported by the rush of water from a little way inland. In Mammalia, the bones and teeth of large antelopes were most abundant; next, those of the buffalo, hippopotamus, and lion. Among reptiles, fragments of the osseous back of the water-tortoise and bones of crocodile were found. Besides bones there were many fragments of pottery, rounded on the edges, which, on fracture, had the same appearance as the half-baked pottery now in use by the natives; but the surface-markings differed from all kinds of pottery known either to Dr. Livingstone or Dr. Kirk. It seems probable that these fragments were washed from the clay strata, as well as the bones, in company of which they are found. Villages in this region are commonly situated near a lagoon or creek, and it is the superstitious custom of some tribes to cast into the water all bones of animals after the flesh is eaten. The bones have evidently not lain long exposed to the sun and air, otherwise they would not have retained so well their form. All the specimens yet examined belong to species now existing in the Zambesi Delta.

The PRESIDENT said he would read a short communication of his own in relation to the Paper just read. They would excuse him if upon this occasion he commingled a little his peculiar science of geology with physical geography. He had always endeavoured to combine them, because he believed one is the foundation of the other. He deeply regretted that the fossil bones collected by Dr. Livingstone and Dr. Kirk should be a remnant only of the fossil remains and other natural history objects collected by them. The chief collections had been sent by trading-vessels to Mozambique, and not having yet reached this country it was to be feared they have been lost. The geological maps of the late Mr. Richard Thornton, the geologist who went out with the expedition, except one map of the Kilimandjaro Mountains, have in like manner been sent away in ships and have not been heard of.

The PRESIDENT then read the third Paper—

3. *On the Antiquity of the Physical Geography of Inner Africa.*

By Sir RODERICK I. MURCHISON, K.C.B.

HE commenced by expressing the regret which every one must feel, that so small a portion of the fossil remains and Natural History objects, collected by Dr. Livingstone and Dr. Kirk, should have

reached England; the greater part having been sent by trading-vessels to Mozambique, and not since been heard of. The great interest which attaches to the bones brought home by Dr. Kirk from the Zambesi is, that, though they have been so long entombed in argillaceous drift as to have lost their gelatine and to have become truly fossil, they are confined to animals still living in South Africa. This supports the theoretical view which Sir Roderick put before the Society in 1852, viz.—that South Africa had, from a remote secondary period, or that of the fossil reptile *Dicynodon*, maintained, throughout its central regions, undisturbed lacustrine and terrestrial characters up to our own days. This view was also demonstrated by Livingstone as regards the Zambesi, and had been well sustained in Central Equatorial Africa by the researches of Burton, Speke, and Grant. In none of these adventurous journeys have the travellers met with ancient fossiliferous formations which would indicate that this continent had been submerged in former periods, like most other countries. Nowhere have they detected limestones with marine organic remains, though they have been especially urged to direct their inquiries to this point. The only marine shells which have been found occur on or near the coasts, and are either of eocene nummulitic, or of recent age. From the observations of Mr. Richard Thornton and others, it is evident that the nucleus or backbone of the continent is formed of the older or palæozoic rocks of geologists; but there is no evidence of the existence of any secondary or tertiary fossiliferous marine rocks in inner Africa. The opinion of the author of the Paper is, that the superficial deposits which do exist are of purely terrestrial and lacustrine or fluviatile origin. The only striking fossil shell which Speke found, in a ridge at a great distance from the coast, proved to be a large *Achatina*, similar in form to the *A. perdicæ*, now living in South Africa. All the evidence which has been obtained sustains the validity of Sir Roderick's hypothesis of 1852, that the same physical conditions have prevailed in Central Africa from those days when that remarkable reptile of the marsh lived, which was discovered by Mr. Bain in the interior of the Cape region, and named *Dicynodon* by Owen. The author then proceeded to remark that the vast interior of the South African continent exhibits no signs of subaërial volcanoes, and consequently its surface has not been diversified by the outpouring of lava-streams, or broken up by efforts of subterranean heat to escape, or subjected to those great oscillations by which the surfaces of other continents have been in recent geological periods submerged beneath the waters of the ocean, and strewed with erratic blocks. In conclusion, he referred

to Dr. Kirk's opinion regarding the age of the fragments of the pottery, and remarked that if the contemporaneity of these remains of human art with the fossil bones be eventually established, we should have every reason to conclude that the Negro type of mankind inhabiting this ancient continent must be of great antiquity. In view of its antiquity, the very slight advances in civilisation made by this race were very remarkable, especially if we compared the Negroes with the American and Polynesian races; for these have had to struggle against the want of those powerful helps to progress—domesticable animals—which have always abounded amongst the Negroes.

Dr. HODGKIN said, he hoped he should not be intruding upon the Society if he offered a few remarks upon the physical geography of North Africa. His observations did not extend much above one hundred miles from the coast; but the appearances which fell under his notice struck him as very remarkable. On landing at Mogador, he found that the sandstone forming the coast and the rocks in the sea were more or less covered with a calcareous coating, very likely of a tufaceous kind. He had then no conception of what it was, or how far it extended. As he proceeded day by day into the interior, he noticed that this calcareous tufa became much thicker, presenting various phenomena, under very interesting modifications, up to Morocco itself. Returning by a different route, thus traversing a triangular space of several miles area, he found the same formation of various depths: sometimes a mere thin coating lying upon limestone in steps, covering it almost like a carpet on stairs; in other places, forming beds of various feet in thickness, and containing embedded in it various masses derived from the rocks of the interior. He always found the *débris* of the covered rocks on one side, and not on the other—a fact which, as respects the place of origin, seemed to indicate the course in which this covering had been derived. In returning from Morocco he crossed the Jebel chain of hills; and even the sides of these hills were covered with the same formation up to a considerable height. These hills were formed of strata, which in some cases were almost vertical; and even in this position their extremities were covered with a layer of this same calcareous matter. He proceeded to Mazagan, and up to the coast he found the same thing. His friend Captain Armitage, who went from Morocco to the coast at Safia, also noticed the same phenomena.

ADMIRAL MURRAY said, after papers were read, one of the first things that Sir Roderick Murchison did was to call upon the Society to return their thanks to the author of the paper. His modesty would not allow him to do the same thing with regard to his own paper. Would they therefore allow him, as an humble individual, to ask them to return their thanks by acclamation to Sir Roderick Murchison for the very interesting paper he had read?

The PRESIDENT returned his hearty thanks for the compliment. In reference to what had fallen from Dr. Hodgkin, he begged to say that his own paper had exclusive reference to Africa south of the Equator. He was perfectly well acquainted with the very different structure of North Africa, in which there is a great number of these formations extending a considerable distance into the interior, which are not found in Southern Africa. Dr. Hodgkin accompanied Sir Moses Montefiore in his recent expedition to Morocco, and if he would bring before the Society a special paper on the structure of these rocks, they would be glad to receive it. As Dr. Kirk was present, and they had not seen anybody from the Livingstone Expedition for some time, he hoped that gentleman would favour them with a few observa-

tions. He would ask him to state the circumstances under which he found the bones.

DR. KIRK said they had entered the Zambesi at its most southern mouth, and had reached the head of the Delta, where the river flows from north to south. The creek in which the bones were found comes from the west. It could not come any great distance, as the rocks found washed down by it were chiefly of clay, with a few calcareous nodules in them; whereas the coast-range is composed entirely of calcareous tufa, the representative of the limestone of the Tertiary times of Mozambique. It seemed to him extremely probable that there is a connexion between these bones and the ancient inhabitants of Africa. He came to this conclusion from all the bones being in fragments; it is not at all likely they would have been broken had they been deposited by the death of animals in marshes. All the long bones were broken, while the vertebræ were perfect and not in any way worn. One of the bones of a buffalo is quite sharp on the edges; yet no skull or long bones, such as the natives would break, were found. Hundreds of specimens were picked up for transmission home, which have not arrived. He had also found a few bones in the banks of Lake Nyassa; the spot was in latitude 19° S., near one of those promontories where the river comes in from the mountain range to the west, passing about four miles of flat alluvial plains, very similar to the Zambesi Delta. These plains are composed of clay beds with ferruginous sand, and at the mouth of these the bones were found—not in the least degree fossilized, yet tending that way, but containing a little oil. These seem to have been deposited in the clay when the lake was drying up, for that lake has stood a hundred feet above the present level. He had no doubt that further research in the lakes will lead to the discovery of the remains of animals, and possibly of human inhabitants.

MR. GALTON asked Dr. Kirk how far the loss of gelatine in bones, lying on the shores of the Zambesi, was a sign of their antiquity. In the hot and dry regions of Africa with which he (Mr. Galton) was acquainted, bones lose their gelatine rapidly. He mentioned a case in the Bishari Desert, where he had seen dead camels lying by the roadside, so thoroughly desiccated and so deficient in organic matter, that he was able to lift an entire quarter of an animal, with ease. Again, in the same latitude as the Zambesi, but in the confessedly drier regions of West Africa, he had noticed recent bones wholly robbed of their animal matter. When burnt they gave out no smell. If bones lost their gelatine as rapidly by the side of the Zambesi as in the other places he had named, it is quite conceivable that they should be destitute of gelatine when first embedded. Of the action of the Zambesi climate upon the gelatine of bones he had no knowledge, and therefore requested information from the experience of Dr. Kirk.

DR. KIRK said the bones in that region not only speedily lose their gelatine, but in a year's time are completely destroyed. But it is not in this case the loss of gelatine: the bones are thoroughly fossilised, are much heavier than ordinary bones, on being broken adhere to the tongue, and on being burnt show no trace of organic matter. There is a great distinction between bones which have had their gelatine extracted and bones which have been undergoing a chemical process.

THE PRESIDENT said, the bones are as completely fossilised as the bones of the mammoth or any extinct animal that have ever been found in the old diluvial drift.

Before adjourning the Meeting, the PRESIDENT announced that Dr. Livingstone may be expected home very shortly. It is perfectly certain that he had returned to the Zambesi in very good health.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Note on the frequent Omission of Readings of the Barometer and Thermometer in Sextant Observations for the Determination of Latitude and Longitude.* By EDWIN DUNKIN, Esq.

(Extracted from the 'Monthly Notices of the Royal Astronomical Society,'
vol. xxiv. p. 121.)

IN offering the following remarks on a subject which has lately given me much trouble, I think it may be useful to call the attention of those members of the Society who are interested in astronomical investigations to a most important fact. It appears that, in the determination of latitudes and longitudes by the sextant, while the greatest care has generally been taken by travellers in the astronomical part of the observations of meridian altitudes, local time, or lunar distances, leaving really nothing more to be desired in that direction;—corresponding observations of the variations in the condition of the atmosphere are frequently omitted, notwithstanding that they are such important elements in the deduction of the proper correction for refraction. This omission is to be regretted, even when the traveller keeps a meteorological journal, as the observations in this instance are generally confined to a few readings daily, which differ considerably, especially the temperature, from what would be recorded about the time of the sextant observation.

These few considerations have occurred to me during the discussion of Capt. J. H. Speke's astronomical observations, the reduction of which was performed under my superintendence. So far as Capt. Speke's observations are concerned, I have nothing but the most unqualified commendation, and I have felt personally indebted to him for the general accuracy and order, as exhibited in the whole of his astronomical records from Zanzibar to Gondokoro. The object of these remarks is, therefore, not to complain of, nor even to criticise, what is already performed, but simply to offer a suggestion which might be available for the future.

As a result of the absence of corresponding meteorological observations, I have been informed that it has frequently been the practice in the reduction of lunar distances, &c., to extract the correction for refraction from a table, constructed with a barometer reading of 30 inches and a thermometer reading of 50°, without any regard to the condition of the atmospheric pressure, or of the temperature of the air at the time of observation. For nautical purposes, this rough method may in general be sufficiently accurate; but when the observing station is elevated several thousand feet above the level of the sea, and when the resulting longitude is intended to fix permanently the geographical position of the place, the effect of the decreased atmospheric pressure becomes of the highest importance, and ought on no account to be neglected.

To exhibit the effect of this omission, I have given as examples, though by no means extreme cases, two different results for longitude with the lunar distances corrected and uncorrected for the variations in the readings of the barometer and thermometer. In the reduction of Capt. Speke's astronomical observations, I was obliged to assume these readings, in consequence of no

3. ERRATA in '*Notes on the Language of South Africa*,' by Senhor Command. JORGE C. DE FIGANIÈRE (*vide* 'Proceedings,' vol. viii. p. 105).

Senhor Jorge C. de Figanière has communicated to us the following corrections of his Memoir, published in the last number of the 'Proceedings':—

Page 106, line 10, instead of "The Nation," read "The Native."

Page 106, line 21, instead of "Botetho," read "Botelho."

Page 106, line 30, instead of "nations," read "natives."

Page 106, line 42, instead of "Sourenço Marques," read "Lourenço Marques (Delagoa Bay)."

Page 106, line 43, instead of "of Hottentots," read "of the Hottentots."

Page 106, line 57, instead of "which extends to Algoa," read "which extends to the lake known by that name (Maravi)."

Page 107, line 1, instead of "Zinganissa," read "Chingamira."

Page 107, line 12, instead of "extending to the coast," read "extending to the west."

Page 107, line 15, instead of "Sancedo," read "Sancule."

Page 107, line 26, instead of "Tungenc," read "Tungue."

Page 107, line 29, instead of "Angvane," read "Anjoanes (Johanna)."

Page 107, line 31—"The inhabitants of our islands of Cabo Delgado speak this dialect with very little difference;" add the following note:—"The reader will find a vocabulary of about 140 words of the dialect of a tribe inhabiting the coast near Delagoa Bay at the close of the last century in the following work:—'*Journal of a Voyage performed in the Lion, extra Indiaman, from Madras to Columbo and Delagoa Bay, in the year 1798; with some account of the Manners and Customs of the Inhabitants of Delagoa Bay, and a Vocabulary of the Language.*' By William White, Esq., Captain in the 73rd Highland Regiment of Foot. London, 1800.

Nearly the whole of this vocabulary has also been incorporated into the '*Vocabulary of the Languages of Mozambique*,' edited by Dr. Bleek.*

* '*The Languages of Mozambique: Vocabularyes of the Dialects of Lourenzo Marques, Inhambane, Sofala, Tette, Sena, Quillimane, Mozambique, Cape Delgado, Anjoane, the Maravi,* &c. Drawn up from the manuscripts of Dr. William Peters, Member of the Berlin Academy, and from other materials, by Dr. Wm. H. J. Bleek, Member of the German Oriental Society. London, 1856.

PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED 25TH JULY, 1864.]

SESSION 1863-64.

Eleventh Meeting, May 9, 1864.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Sir Richard G. Glyn; Robert Carr Glyn, Esq.; Wilson Lloyd, Esq.; J. Kirke, Esq.; Charles Faulkner, Esq.; E. L. Betts, Esq.*

ELECTIONS.—*Robert Burn, Esq.; Charles Faulkner, Esq.; Lieut.-Col. A. Fremantle; George Goodall, Esq.; Capt. R. C. Holms; Vesey Weston Holt, Esq.; Capt. J. P. Luce; Capt. Roderick M. Murchison; R. W. Roberts, Esq., B.A.; H. Oliver Robinson, Esq.; Admiral Saurin; Frank Simpson, Esq., MED. STAFF; Edward Webster, Esq.; Mark B. Whyte, Esq.*

ACCESSIONS TO THE LIBRARY.—‘Handbook of the Panama Railroad,’ by F. N. Otis; presented by John Power, Esq., F.R.G.S. ‘Le Japon; Histoire et Description, Mœurs, Coutumes, et Religion,’ par M. E. Fraissinet; presented by M. V. A. Malte-Brun, H.C.F.R.G.S. ‘Expeditions on the Glaciers; including an Ascent of Mont Blanc, Monte Rosa, Col du Géant, and Mont Buét,’ by a Private of the Thirty-eighth Artists, and Member of the Alpine Club. Continuations of Transactions, &c.

ACCESSIONS TO MAP-ROOM.—W. M’Leod’s Middle-Class Atlas, on 29 Maps.—New Zealand: Waikato River, on 2 sheets, showing the seat of war.—Atlas, by Dr. Hochstetter.—China: Large Diagram, presented by Capt. Sherard Osborn.—World, in Hemispheres; 12 copies; School Series.—Photograph of *Erebus* and *Terror* in a Gale in the Pack, January 20th, 1842; presented by Staff-Commander

Davies.—Continuation of the Admiralty Charts and Ordnance Maps.

EXHIBITIONS.—Stanford's Library Map of South America.—Views of the Victoria Falls of River Zambesi, by Mr. T. Baines.

The PRESIDENT congratulated the Society on the reappearance among them of Sir Woodbine Parish, one of their earliest members, and who, having thrown great light on the geography of South America, was now about to make an additional contribution respecting that region, of great novelty and importance.

The Paper was entitled—

1. *A Journey across the Southern Andes of Chile, with the object of opening a New Route across the Continent.* By DON GUILLERMO COX.

Translated and Communicated by SIR WOODBINE PARISH, K.C.H.

THE journey, of which the present Paper gave an account, was undertaken towards the close of 1862, by Don Guillermo Cox, a gentleman born in Chile, but of English parentage. Its object was to discover an easy route between the new Chililian settlements on the Pacific coast, in 40° and 41° s. lat., and the river Negro, which, eighty years ago, had been proved by Villarino, a Spanish explorer, to be navigable from the eastern side of the Andes to the Atlantic. He equipped an expedition at his own cost, at Port Montt, a new German settlement, now containing 15,000 inhabitants, opposite to the Island of Chiloe, and proceeded, in December, 1862, by way of the two lakes, Llanquihue and Todos Santos, towards the almost unknown inland sea of Nahuel-huapi. He traversed the lakes in boats, and passed over the dividing ridge of the Andes, by the Rozalez Pass, which had been discovered in 1855 by one of Señor Cox's party, Don Vincente Gomez. The height of this Pass was determined at 2760 English feet. Arrived at the far end of Lake Nahuel-huapi, on the banks of which they had built a boat for the remaining part of their journey, Señor Cox was rejoiced to find a broad stream issuing from it in the direction of the rivers which flow into the Atlantic. Nine of the sixteen persons who formed the expedition here returned to Port Montt; the rest embarked in one of the boats, and descended the river, which is called the Limay, and forms one of the affluents of the Rio Negro. The voyage was attended with great risks, owing to the rapids; and the various adventures encountered were narrated in a lively manner by the author. At length, when within five miles of the point to which Villarino had attained in ascending the Rio Negro from the Atlantic, the boat

was upset, and the party escaped drowning only to fall into the hands of a tribe of Pampas Indians encamped near the spot. Señor Cox appeased the anger of the cacique, who threatened to put him to death for having visited his territory without permission, by playing a tune on a flageolet he had fortunately saved from the wreck. The cacique farther promised to assist him in reaching the Rio Negro, on condition that he first went to Valdivia for presents. The recrossing of the Cordillera by the pass of Ranco, at a more northerly point towards Valdivia, was accomplished without much difficulty; but the main object of Señor Cox's journey, namely, the opening of a new passage across the continent, was for the time frustrated by the hostility of the Indian tribes; although Señor Cox, so far from being discouraged, was determined to renew the attempt, and writes to Sir Woodbine Parish that, after accomplishing the passage down the river Negro, he shall never rest till he has made a complete exploration of all Patagonia to the south of it.

The PRESIDENT said their best thanks were due to Sir Woodbine Parish for having translated this interesting communication. He was happy to see present that distinguished naval officer, Admiral FitzRoy, Commander of the *Beagle*, who explored the coasts of the region under consideration during five years. He had fixed the altitude of some of the mountains mentioned in the Paper; and these heights were found to be so accurate, that the author had adopted them. His gallant friend had also thrown much light on the natural history of South America, by taking with him Charles Darwin; and as it was not often they had the pleasure of seeing him at their Meetings, his time being much occupied with meteorological inquiries of great importance, he hoped he would now offer a few observations on the subject of the Paper.

Admiral FitzRoy, after complimenting Sir Roderick Murchison upon his unintermitting exertions in the cause of Geographical Science, to which he attributed much of the success of the Society, said the interesting Paper which Sir Woodbine Parish had brought before them related to a country where a man does not go, as it were, with his life in his hand. It is a country suited to the constitution, habits, and pursuits of Englishmen. From lat. 45° s. to 35° s., it embraces, on the western side, some of the finest regions in the world. One proof of its adaptability for colonisation by Europeans is, that, during the last ten or twelve years, no less than 15,000 Germans have settled at Port Montt, a spot where, when he was employed in exploring some twenty-nine or thirty years ago, there was not an individual except the aborigines; while a little farther to the north, where at the time of his visit a few fragments of coal were found lying on the surface, and were not thought worth picking up, there are now from twenty to thirty ships at a time loading coal, with all the necessary contrivances on land for that purpose. The region north of Chiloe and Port Montt, and between that and the south of Chile—between Valparaiso and Concepcion—is one of the finest he had ever seen. Then, there is the immense range of the Andes running far north and far south, containing an unlimited store of minerals, probably of nearly all kinds. Wherever the mountain-ranges had been examined, from the farthest south, among the broken islands of Tierra del Fuego, up to Central America, they have been found rich in minerals. From the eastern side of these mountains across a

very broad space of flat country, the *Pampas*, there is the easiest possible access. So valuable did the original Spanish explorers consider it, that one of their first objects, after getting a sort of temporary possession of the outskirts of the country, was to push a mission through to the Lake Nahuel-huapi. At the east side of the lake a Jesuit mission was established in 1670, and continued there till about 1715, when it was broken up in consequence of the hostility of the Indians. From that point the whole country to the east was brought within their reach; but the wandering tribes of Indians, having horses which they obtained from the original Spaniards, kept the Spaniards so completely in check, that to this day they have remained in a state of independence. From about lat. 40°, towards the south, the country is open for civilised settlement. The Chilians claim one side, and the people of Buenos Ayres the other; but they have made little or no use of it. Within the last two years he had heard that a colony of Welshmen had gone out to the east of that country, and settled, he believed, near the mouth of the River Chupat, which runs a little to the south of the River Negro. There is also a colony of Chilians in the Straits of Magellan, and there are our own settlements at the Falkland Islands, and perhaps at the mouth of Santa Cruz. So that all sides of that region are beginning to be appropriated by civilised man. The Paper also drew attention to the character of the country. The whole of the west side is well-timbered, most fertile, and very thinly peopled. The readiness with which the Chilians welcome settlers from Europe is shown in some degree by the success of the German colony. He might just refer to the curious fact of there being forests of apple-trees in the neighbourhood of Lake Nahuel-huapi. These apple-trees at the time Villarino was there were in full bearing, consisting of several varieties of good edible apples, showing that they must have been grafted. They were either planted and grafted by the missionaries, or they must have been indigenous and improved by the Indians by grafting. This country has also indigenous potatoes. Our potatoes for the last half century have been getting worse, and it has been a matter of surprise to him that no one has taken steps to import the Indian potato from that part of the world. He had eaten three different kinds of potato among the Indians, between Valdivia and Concepcion, and they were better than any he had ever eaten. He might also advert to the great railway works which Mr. Wheelwright is carrying on in South America, between Rosario on the River Plata and the country across the Cordillera of the Andes, also between Buenos Ayres and a port to the south by another railway; from which, when completed, we might hope for great results.

The PRESIDENT said there was another short communication upon the subject of South America, from Consul Hutchinson, which the Secretary would read. As the name of Mr. Wheelwright had been mentioned, he might state that they had marked on the map exhibited to the Meeting, the projected line of the remarkable railroad which Mr. Wheelwright proposed to carry across the Andes. The subject was brought before the Meeting by Mr. Wheelwright, Newcastle-upon-Tyne, by Mr. Wheelwright. His proposal was to carry a railroad at a height of 16,500 feet over a pass in the Andes. The project is a gigantic one; but from the success which has attended Mr. Wheelwright's undertakings on the Pacific, and the power he has shown in moving locomotives up very steep inclines, he had no doubt that, if the capital were supplied him, the enterprise would be found perfectly feasible.

Mr. SPOTTISWOODE then read the following communication from Mr. Consul Hutchinson:—

2. *Details of a Journey through parts of the Salado Valley and across some of the Argentine Provinces.* By THOS. J. HUTCHINSON, H. M. Consul, Rosario.

THIS Paper contains an account, in very minute detail; of a journey performed by Mr. Hutchinson through the Argentine provinces, and especially through the valley of the river Salado. It gives the distances from place to place with more exactness perhaps than has been done hitherto, and is accompanied by an excellent map, by Dr. Burmeister, of Buenos Ayres, which, although founded on those drawn by Mr. Arrowsmith for Captain FitzRoy's and Sir Woodbine Parish's works, contains some more recent data and corrections by Mr. Hutchinson himself. The whole country, from the mouth of the Plata to Diamante in Entre Rios, is described as flat; and the aspect of the undulating land of the Entre Rios province is described as very pleasing from the contrast it offers to the level region. The Salado is called the Northern Salado River, to distinguish it from the southern stream of the same name, which flows through the province of Buenos Ayres. Its mouth lies between Diamante and Santa Fé, in s. lat. $31^{\circ} 38' 34''$; w. long. $60^{\circ} 39' 40''$. Little or nothing was known of it previous to its exploration by Captain Page, of the U. S. Navy, about ten years ago, who ascended it in a small steamer to a point 340 miles from its mouth. The river has since been more carefully examined by Mr. John Coghlan, civil engineer at Buenos Ayres, who has pronounced on the possibility of its navigability to a distance of nearly 1000 miles above Santa Fé. The line of railroad from Rosario to Cordova, projected by Mr. Wheelwright, is carefully laid down upon the map; and Mr. Hutchinson (who holds the post of H.M. Consul at Rosario, and is therefore a most competent person to form an opinion upon such a subject) bears the strongest testimony to its great and undoubted importance to the future prospects of the whole of that republic. The port of Rosario (he says) is the natural outlet for eleven out of the fourteen provinces into which the Argentine Republic is divided; and the carrying trade, effected by bullock-carts, between the city and the interior, amounts to nearly 18,000 tons per year.

MR. WHEELWRIGHT said that the communication from Consul Hutchinson reminded him that a new pass had been discovered and examined in the Cordillera of the Andes, which might perhaps be found more practicable than the one he had explored, with reference to an interoceanic communication, in the

latitude of Atacama in 1855. The elevations to be overcome in the new pass appear lower than anything he had obtained in the north. The only obstacle which presented itself to his mind in relation to it was the snow—it being in the latitude of 35° s., whereas the Pass of San Francisco is in 27° s., and for nine consecutive years passengers had passed and repassed without interruption. He came to the conclusion, from this circumstance, that the northern pass might be found practicable for locomotive power, and the surveys he had made induced the conviction that practical gradients could be obtained. Such has been the result; and although a longer route and far to the north, its freedom from blocking snows was a powerful argument in its favour. It would certainly be most desirable that a transandine communication should embrace Santiago, the seat of government in Chile, and the commercial capital Valparaiso, both connected by a railway, which extends to Curico, from 80 to 100 miles south of Santiago, and the apparent starting-point through the Pass of the Andes. Should the statements prove true (and they are doubtless entitled to credit), and no obstacle interpose, this route would obtain a decided preference over that of the north. Should this be the case, the projected railway from Cordova northward to Horqueta, instead of bending westward, as originally proposed, towards the Cordillera, would continue its northerly course through Tucuman, Salta, Jujuy, and finally enter Bolivia, or what was formerly Upper Peru, and restore its foreign commerce and trade to Buenos Ayres; but instead of a journey of three or four months, it would, through railway facilities, be accomplished in as many days. Should the southern pass be found practicable, it would take the Rosario and Cordova line of railway from the valley of the La Plata, and continue it on to the Villa Nueva station, about 160 miles, and at this point diverge and take a western direction through the province of San Luis to Mendoza, from thence seek the Cordillera Pass, and unite on the Great Southern Line, which he (Mr. Wheelwright) projected in 1842, and which has recently reached Curico, the probable junction of this interoceanic communication. The Cordova Railway is already in progress. It has been taken up in England by Mr. Thomas Brassey, who is thoroughly capable of appreciating this great undertaking, which, when carried out, will embrace in trunk-lines 3000 miles of railway.

The PRESIDENT said he wished before adjourning the Meeting to call attention to the beautiful paintings of the Zambesi Falls, by Mr. Baines, the artist who accompanied Dr. Livingstone in his travels. Mr. Baines had sent home a vast number of pictorial illustrations; and he hoped that, under the patronage of the Society, some publisher might be induced to bring out a selection of them in coloured lithography.

Twelfth Meeting (ANNIVERSARY), 1 P.M., May 23rd, 1864.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

THE SECRETARY read the minutes of the previous Annual Meeting, and also the Regulations for the conduct of the present one; after which Dr. Webster and Mr. Arrowsmith were appointed scrutineers for the ballot by the President.

Captain R. R. Hutchinson; John W. Bone, B.A.; John Cameron; John W. Cannon; F. T. Jeyes, and Edward Warner, M.P., Esqrs.,

were elected as members of the Society: and Captain H. Toynbee; Edw. Bellamy; W. F. Ives; A. Mackinnon, and E. O'Riley, Esqrs., were proposed as candidates for election at the next meeting.

The Report of the Council was read and adopted.

The PRESIDENT then delivered the FOUNDER'S GOLD MEDAL to the Baron C. VON DER DECKEN, and the VICTORIA GOLD MEDAL to Captain JAMES A. GRANT, who each returned thanks.

After the reading of the Anniversary Address, Sir Henry C. Rawlinson proposed, that the regulation which provides that the President be changed every two years should be suspended in the election that was now to take place; stating that Sir Roderick Murchison had already explained, in his Address, the peculiar circumstances under which he was unanimously requested by the Council to allow himself to be put in nomination as President for the ensuing year.

Mr. JOHN CRAWFURD seconded the resolution, which was then put and carried unanimously.

The Scrutineers, after the completion of the ballot, reported that Sir Roderick I. Murchison had been unanimously re-elected President, and that the changes recommended by the Council had been adopted: namely, John Crawford, Esq., F.R.S., and Maj.-Gen. Sir H. C. Rawlinson, K.C.B., to be Vice-Presidents in place of Sir G. Everest, retired, and Lord Ashburton, deceased: Laurence Oliphant, Esq., Secretary, to replace W. Spottiswoode, Esq., who has resigned: Vice-Admiral Sir G. Back; T. H. Brooking, Esq.; Rt. Hon. Sir David Dundas, M.P.; the Earl of Donoughmore; Lieut.-Gen. Fox, and H. Danby Seymour, Esq., M.P., to succeed, as Councillors, John Crawford, Esq., and Sir H. C. Rawlinson, Rt. Hon. Sir Thomas Fremantle, Admiral Murray, Commodore A. Ryder, E. O. Smith, Esq., and Colonel H. Yule. The appointment of Reginald T. Cocks, Esq., as Treasurer, in place of R. Biddulph, Esq. (deceased), was also confirmed.

Dr. WEBSTER, in announcing the result of the scrutiny, said that he took the opportunity of thanking the President and Council for adopting the suggestion he threw out last year with reference to the balloting papers, to the effect that they should be sent out, as is the custom in other Societies, two or three weeks previous to the Anniversary Meeting, in order that Fellows might have ample opportunity to select the names of those whom they wished to serve on the Council.

The Earl of DONOUGHMORE, in conclusion, proposed a vote of thanks to the President, the Council, and the Scrutineers, coupled with the request that the Address be allowed to be printed; and the PRESIDENT, in acknowledging the compliment, stated that after the expiration of the present year's service he must positively retire.

The Meeting then separated.

PRESENTATION

OF THE

ROYAL AWARDS.

THE Founder's Gold Medal to Baron C. VON DER DECKEN, for his two surveys of the lofty mountain of Kilimandjaro, which he ascertained to be capped with snow, and to have an altitude of 20,065 feet. The Patron's or Victoria Gold Medal to Captain JAMES A. GRANT, for his journey from Zanzibar across Eastern Equatorial Africa to Egypt, in company with Captain Speke, and for his contributions to the work of that Explorer.

The PRESIDENT having called up the Baron C. von der Decken, thus addressed him :—

“ BARON CHARLES VON DER DECKEN,

“ This Medal is decreed to you for the two remarkable journeys which you have performed from the East coast of Africa to the great Mountain of Kilimandjaro, in each of which, with the assistance of Mr. Richard Thornton in the first and of Dr. Kärsten in the second, you made many astronomical observations, and constructed a contoured map of the region. You also determined numerous altitudes by barometrical measurement, and estimated the highest of the peaks of the mountains to be 20,065 English feet above the sea, and proved it to be covered with snow.

“ In these expeditions you further collected rock specimens which have demonstrated that, in a remote period, this snow-capped mountain was an active volcano.

“ The accuracy of the observations made in your last journey was proved by a comparison of the chronometers you took with you, which, having been compared on your return to Zanzibar, were found to have varied only 7" in 120 days.

“ I further applaud your unabated zeal and energy in your present desire to explore the interior of Eastern Africa, inasmuch as you have just fitted out at great expense a new expedition, and have constructed a river iron-steamer wherewith you hope to ascend one of the rivers flowing from Mount Kenia, and thence to explore unknown regions, and if possible to follow down one of the main eastern affluents of the Nile. And, as you have named your new vessel the *Guelph*, I trust that this name, cherished by Englishmen who lived in the days when Hanover and England

constituted, as it were, one country, may be a happy omen of the success which we all hope may crown your noble enterprise."

Baron VON DER DECKEN replied :—

"This is but the second time that I have had the honour of being present at a Meeting of the Royal Geographical Society. The first time, besides being kindly welcomed, I was elected an Honorary Member of the Society, and now a still greater honour is awarded me. It is quite impossible for me, as a stranger unfamiliar with the English language, adequately to express my thanks for the distinction. It is true, I always entertained a hope that, after returning from my travels, I might perhaps have the good fortune to receive a Medal, a gift which every Explorer ought to look forward to as the highest testimonial of his work having been well and successfully done. Whether the journey for which I am now preparing will be a success, God only knows! But I have the firmest determination; and, if any accident should arise to myself during the expedition, I have made such disposition that my party (consisting of several able and scientific men) will be able to carry out my plans.

"Happy and proud as I am to-day, there is still some sadness mingled with it. I miss here my poor friend the late Richard Thornton, your countryman and my companion during my first excursion to Kilimandjaro. We did not at that time reach so great an elevation as I did in the second journey, in which, with the aid of Dr. Kärsten, I corrected the mistakes of the first. Thornton was nevertheless the first European besides myself who penetrated farther than the low hills surrounding the great mountain, and settled by his testimony the question of snowy mountains in Equatorial Africa. He was a good companion, and extremely useful during the expedition, by taking observations, working very laboriously with the theodolite, and as a geologist in collecting and describing the rocks. If I ever come back to Europe and publish an account of my travels, I shall not omit to give due credit to my lamented companion.

"In conclusion I feel it my duty to express publicly my best thanks to you, Sir Roderick, our distinguished President, who, from the first time I made your acquaintance, were so kind as to give me in every way assistance and good counsel regarding my new expedition, and who have used your influence to obtain for me the support of Her Majesty's cruisers as well as of the authorities on the African coast."

In presenting the Patron's Medal to Captain Grant, Sir Roderick thus addressed that Officer :—

"CAPTAIN GRANT,

"Eleven months have elapsed since we received your leader, Captain Speke, and yourself within these walls, with the cordial acknowledgment of the great services you had performed in opening

out Eastern Equatorial Africa, and in showing how the White Nile flowed from the very lake previously discovered by your distinguished companion. Captain Speke having, on his arrival at Gondokoro, received the Medal most justly granted to him for the great discovery of Lake Victoria Nyanza, we, in conferring this Medal upon you, wish it to be understood that we once more emphatically mark our deep sense of the value of the first great exploration of those lands around it, made by Captain Speke and yourself.

"When you returned here our Anniversary had passed over, and both our Medals had been adjudicated, or you would, doubtless, before now, have received the highest honour which we have it in our power to bestow. It was, however, a source of true gratification to us to see that the King of Italy was, in the mean time, foremost in recognising your merit, as well as that of your skilful leader, and affixed to each of his Medals the appropriate motto of 'Honor a Nilo!'

"On my own part I can truly say that, on the many occasions in which it has been my lot to present Medals to Explorers of distant regions, I never had greater satisfaction than on the present occasion. For now that I hand to you this Medal, bearing the effigy of Queen Victoria, I feel that we Geographers are not merely recompensing the noble and disinterested companion of Speke, but, as a soldier of the olden time myself, I have a special pride in recognising in you the gallant young Officer, who, in the Indian mutiny, and despite a severe wound, was the means of saving from serious disaster the rear-guard of the illustrious Havelock, as he advanced to the relief of Lucknow.

"Accept, then, this, our gracious Patron's Medal, and consider it as our Victoria Cross."

Captain GRANT then replied:—

"Sir Roderick Murchison and Gentlemen,—It was during a recent sojourn on the Continent that I received the communication from the Council of the Royal Geographical Society, announcing that they had unanimously awarded me one of their Gold Medals of the year. I assure you the receipt of this communication gave me intense pleasure; but it was a surprise to me, for I little thought I had done anything to merit so high and distinguished an honour. And to receive the Medal from your hands, Sir, from whom I have always experienced so much kindness, enhances the value of a gift which I shall cherish to my dying day. I feel so much embarrassed by the distinction you have conferred upon me, that I am quite unprepared to express myself in the language I should wish. I hope, therefore, you will excuse the few words in which I thank you for the honour you have done me."

ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY.

Delivered at the Anniversary Meeting on the 23rd May, 1864,

BY SIR RODERICK IMPEY MURCHISON, K.C.B.,

PRESIDENT.

GENTLEMEN,

In commencing this Address, which, for the reasons I assigned at the preceding Anniversary, I fully believed would be the last I should have the honour of delivering to you, I feel that, in addition to what has appeared in the Report of the Council, I ought to explain how it has happened that again a list has been prepared in which my name is proposed as your President elect for the ensuing year.

Let me assure you, Gentlemen, that my retirement had been completely arranged. With the advice of some of our leading members, I had, in fact, secured the services of a distinguished geographer and scholar, to be recommended as my successor, when unforeseen circumstances occurred which created disquietude in the minds of many well-wishers of the Society, if coupled with my retirement from office. Our excellent senior Secretary, Mr. Spottiswoode, having found it absolutely necessary, from the pressure of his other avocations, to retire, and our new Assistant-Secretary, Mr. Greenfield, having recently met with a premature death, the Council laid before me their unanimous request, that in this difficulty, and with a new staff to be appointed, I would consent to continue in office. As nothing could induce me to leave the good geographical ship, to which I am so heartily attached, in a moment of distress, so, in the belief that I may be able to steer her for a time, I have consented to remain at the helm for one year, if such should prove

to be the wish of the Society. You therefore, Gentlemen, if you choose me once more, must take upon yourselves the responsibility of re-electing your weather-beaten chief, who on his part can only assure you that, if you do so, he will put forth in your cause whatever energy is left in him.

In the mean time I may say that the losses in our staff have been well made up; for whilst our accomplished Secretary, Mr. Clements Markham, remains, Mr. Laurence Oliphant, the well-known traveller in many countries, takes the place of Mr. Spottiswoode; and the post of Assistant-Secretary is already occupied by a true traveller and good geographer, Mr. H. W. Bates, the author of that popular and instructive work, 'The Naturalist on the River Amazons.' The man who, in pursuit of the beauties and truths of natural history, has spent eleven years of his life in regions known to few Europeans, and who has since published so striking an account of them, will, I anticipate, be found to possess all the qualities of a good Assistant-Secretary and Editor of our publications.

Since our last Anniversary we have made an addition to our members of eighteen distinguished geographers of foreign lands, as mentioned in the Report of our Council; and in this act we have not only honoured ourselves, but have greatly augmented our means of obtaining the best and freshest knowledge of the advances of our science in France, Germany, Switzerland, Russia, South America, the United States, Portugal, and Denmark.*

In former years I have had, as I now have, the satisfaction to announce that the numbers of our ordinary Fellows have increased, and are increasing, and that our losses by death have been small in comparison with the great accession of new Fellows. In fact, the elections made in two of our ordinary days of meeting would replace the whole number we lose by death during the year. If this prosperous, flowing tide should continue, we may really reach that stage of augmentation for which no place of meeting would suffice, and then we may be obliged to limit our numbers, and fill up the annual vacancies only.

OBITUARY.

I naturally commence the record of the losses we have sustained in the deaths of our Associates with a notice, however brief, of that good and well-beloved man, my immediate predecessor, the late Lord

* See Council Report, Appendix F, p. 25.

ASHBURTON. Born in the last year of the last century, William Bingham Baring succeeded to his father, the first peer, the great merchant prince Alexander Baring, whose name is bound up in geographical annals, as having been the chief British Commissioner, assisted by Colonel Mudge, R.E., and my friend W. G. Featherstonhaugh, in settling the boundary between the United States and British America. Receiving part of his education in Geneva, he gained good classical honours at Oxford, where he was a member of Oriel College, and where under Whately, the late Archbishop of Dublin, and Davison of Oriel, he acquired that taste for general knowledge which he ever retained. During the administration of Sir Robert Peel, and when a member of the House of Commons, he occupied the official posts of Secretary of the Board of Control, of Paymaster of the Forces, and of Treasurer of the Navy.

As soon as he became possessed of the title and the great landed estates of his father, Lord Ashburton was enabled to exercise liberally his love of true beneficence; and on numberless occasions he quietly and unostentatiously, but zealously, occupied himself in acts of well-considered encouragement of merit, and in countless works of charity; whilst his exertions to improve the education and condition of the humbler classes were unceasing.

In his capacity of President of this Society, I had perhaps more opportunities of estimating his hearty devotion to our cause than most of my Associates, and I can sincerely declare, that nothing but ill health ever prevented his personal attendance at our meetings; and that even when pressed by illness, his thoughts were anxiously directed to our well-being and advancement. When able to be among us, his elegant and appropriate Addresses, his genuine friendliness, and participation in our proceedings, endeared him to all the Fellows of this Society. It has been incorrectly stated that he resigned his office on account of ill health; for, threatened as he was with the malady which ultimately proved fatal, he strove to do his duty throughout his biennial term of office. As his malady increased, his health underwent so great a change for the worse, that but for the unremitting and soothing attentions of the devoted and accomplished lady who mourns his loss, his life could not have been protracted as it was to the 23rd of March last.

In short, our late President was a man of so guileless and honourable a stamp, that no one could have had much intercourse with him without loving him; and those who knew him best will join with me in asserting that few men of our generation have

passed through life more usefully or blamelessly, or left behind them truer feelings of regard and affection, than William Bingham Lord Ashburton.

Rear-Admiral John WASHINGTON, C.B., F.R.S.—In the year 1858 it was my province, in reviewing the meritorious life of that eminent hydrographer and noble character, Rear-Admiral Sir Francis Beaufort, to solace my Associates with the reflection, that the British Navy and this Society hailed a most worthy successor in our former Secretary, Captain Washington. Alas! he also has now been taken from us. Born in 1800, John Washington entered the Navy in 1812, and saw much active service in the frigate *Juno*, in the waters of the Chesapeake and on the American coasts. Afterwards, in the *Sibyl* frigate (Capt. Forrest) he was occupied in pursuing the American Commodore Rogers up to Spitzbergen. In this voyage he acquired much scientific knowledge under the then master of the vessel, afterwards Sir W. Bain, in making astronomical and magnetical observations. Following up this knowledge in the Royal Naval College at Portsmouth, he there obtained a prize gold medal in 1816; after which he served three years in the *Forth*, both on the North American Station and in the Pacific. While on this last service he nearly lost his life through a sailor's falling upon him from the mast, and throwing him senseless into the sea, from which he was only rescued by extraordinary efforts.

When appointed Lieutenant in 1821, and obtaining leave to come home, he disembarked at Valparaiso, and crossed the Andes to Mendoza, riding over the Pampas to Buenos Ayres. Returned to England, he was transferred to the *Parthian*, and passed two years in the West Indies; and afterwards, obtaining leave, he travelled in France, Spain, and Italy, improving himself in languages. Going to sea again in 1827, he was four years afloat in the Mediterranean, in the *Weasel* and the *Dartmouth*; and during this service he explored the interior of Morocco in company with the English Consul-General Drummond Hay, making astronomical observations in his route, and fixing the true position of places hitherto undetermined. A memoir containing these observations was a communication to our Society in the first year of our existence, and published in the first volume of our Journal.

Constantly occupied in useful studies, he obtained the rank of Commander in 1833, and was ever active in promoting the success of our then young Society, when, in 1836, he succeeded to our first Secretary, Commander Maconochie. Once placed in that office, I

well recollect what vigour he infused into all our proceedings, whether in stimulating important travels and enterprises, or by greatly improving our publications, in the editing of which he laboured assiduously, assisted only by a single clerk. It was he, indeed, who introduced among us the practice of annually reviewing the progress of geography in the past year, a practice which was not adopted by our Presidents until that distinguished scholar the late Mr. William R. Hamilton set the example in 1839. I am reminded by the eloquent and admirable sketch of his life by M. d'Avezac that a very important anonymous suggestion made by Washington, and signed A. Z., which was addressed to the President and Council of the Royal Geographical Society, and suggesting the Antarctic Expedition of James Ross, was never printed, though it was recorded in the Bulletin of the French Society. After five years of invaluable services to this Society, Washington, in 1841, took the command of the *Black Eagle*, in which ship he brought the late King of Prussia to England. My friend, Baron Alexander von Humboldt, being the King's chief adviser, the favourable impressions produced on the mind of the illustrious traveller by the knowledge and acquirements of the ex-Secretary of the Geographical Society were such that, on the recommendation of that Sovereign, Washington obtained the rank of Post-Captain. Up to the year 1847 he was employed as a Nautical Surveyor in the *Blazer*; and on many parts of our own coasts he set that example of scrupulous exactitude of observation which had been duly impressed upon him by his revered chief, Beaufort, to whom in 1855 he succeeded as Hydrographer of the Admiralty. In this new post, following the bright example of Beaufort, he introduced the same spirit of action and order which he had so efficiently applied to the improvement of our Society, and was a thoroughly conscientious, indefatigable, and clear-headed Director of that laborious office. In it, besides compiling for us annually that excellent résumé of all the British Nautical Surveys of each year, which forms so highly valuable a portion of our Journal—which is now continued through the goodwill of his successor, Capt. Richards—Washington lost no opportunity presented to him by his official position, of rendering us essential service in promoting every geographical expedition of importance. Deeply imbued, like many a gallant seaman, with the profoundest sense of the obligations and duties of a Christian, he had all along taken the liveliest interest in every exploration of Africa which might tend to the improvement of the natives and the abolition of the trade in slaves. It

was therefore with especial zest that he backed up Livingstone when the latter had resolved to execute his second journey; and it was chiefly owing to the energy of Washington that the bold traveller was furnished with the steam-vessel by which the ascent of the Zambesi river was to be accomplished, though the expense of fitting out a vessel drawing less water for the ascent of the river Shiré fell entirely upon Livingstone. Nor had Washington been less conspicuously and untiringly active in supporting Lady Franklin through all her efforts in search of her missing husband; and if others had been as true-hearted in that cause as those lamented men, Beaufort and Washington, that heroic lady would not have been left to spend her own fortune in doing that which it was the bounden duty of the country to have accomplished. From repeated conversations on this subject with both of these eminent men, I know how truly they grieved with myself on the loss of national dignity and right feeling which that apathetic conduct involved.

Admiral Washington was one of those men of highly nervous temperaments, and feeling hearts, who inevitably fall victims to their zeal and sensibility, whilst duller men plod on and live. Exhausted by over-exertion in his office, he obtained leave of absence to travel on the Continent, in the hope that his shattered health might be restored; and with this object he repaired to Havre. There he made at first some progress, particularly when reanimated and rejoiced by the arrival of his second son, Henry Halford, from the Chinese station; when suddenly he was struck down by an order that the youth should sail to the Pacific. With natural impatience he hastened, ill as he was, to London, to try to avert his disappointment; but having failed, his despondency and ill-health increased, so he wandered into Switzerland on a forlorn-hope, and only returned to Havre to die in the sixty-third year of his age, happily attended by his affectionate wife and his youngest son, Francis Palmer.

With the sincerest regard for the personal character of Admiral Washington, and the deepest sense of the great services he rendered to this country, and to this Society in particular, it is indeed most gratifying to reflect that ample justice has been done to his memory by our distinguished Foreign Member, M. d'Avézac, in a notice of his life and works, read before the Geographical Society of Paris; whilst the honours which were paid to his remains by all the authorities, as well as by the inhabitants of Havre, on the

occasion of his interment, will never be forgotten by the numerous friends of John Washington. This is indeed one of those kindnesses which will the more link us on in bonds of continued friendship with our powerful allies and worthy rivals, the French. Admiral Washington was a Fellow of the Royal Society, and of many scientific and philanthropic establishments.

PORTLOCK.—By the decease of Major-General Joseph Ellison Portlock, of the Royal Engineers, our Society has lost a truly sound geographer. He was the son of Captain Nathaniel Portlock, R.N., who circumnavigated the globe in the days of Captain Cook, and died one of the Captains of Greenwich Hospital. His son, who was born at Gosport in 1794, was educated there and at Tiverton, and finally at the Royal Military Academy at Woolwich. Young Portlock obtained his first commission in the corps of Royal Engineers in 1813. In 1814 he was sent to Canada, where he served till September 1822, and took an active part in the war with the United States. He was at the siege of Fort Erie, and, when the army retreated, was the engineer who constructed the lines and *tête-de-pont* of Chippewa, at which Sir Gordon Drummond made his successful stand and saved Upper Canada. After his return from foreign service Lieutenant Portlock was appointed in 1824 to the Ordnance Survey, then under the direction of Colonel Colby,* and was one of the assistants of that able officer, in companionship with Lieutenants Drummond and Larcom, in preparing the materials for the measurement for the base of triangulation. Accompanying Colonel Colby to Ireland, he worked with the Trigonometrical Surveyors on Divis Mountain, near Belfast, where the first observations of distant points were made with the heliostat, then recently invented by Lieutenant Drummond, R.E., afterwards Under Secretary for Ireland. Becoming the leader of the trigonometrical branch of the survey in Ireland, Portlock underwent great hardships on the bleak coast of Donegal, in one part of which, though two of his soldiers perished, he perseveringly held on until he brought his observations to a successful issue. Completing the triangulation on various Irish mountains, he remained, in 1827, under canvas at heights of 2000 feet above the sea, till the middle of January. Up to that time he had been accompanied by Lieutenant, now Major-General, Sir Thomas Larcom, K.C.B., at present

* See my sketch of Colonel (afterwards General) Colby's eminent services, in the Address of 1853, when I presided over the Society. Vol. xxiii. p. lxi.

Under Secretary for Ireland, but thenceforward he continued his labours single-handed. In short, he indefatigably pursued his observations with the great theodolite in all the chief mountains of Ireland, until the network of the principal triangles was completed; whilst by observations across the Channel, mainly effected by the employment of heliostats, the Irish triangulation was united with that of England and Wales.

Portlock also undertook the laborious duty of correcting the discrepancies which arose between the established points of the great triangulation and the junctions of the detailed work of the field-surveyors, and, provided with assistants, he so advanced these operations that in one year two millions of acres were completely surveyed. With such ceaseless labour in observation, calculation, and horizontal triangulation, Portlock united an elaborate system of vertical measurements. The altitudes were first deduced from the level of the sea by actual levelling to bases of altitude, and from those bases transferred, by angles of elevation and depression, to the summit of every mountain, hill, and station, at distances averaging a mile asunder, on which the minor levellings of the detail survey depended. This also was at first performed in the separate districts, but ultimately generalised into a system. With this view, Portlock personally carried a line of levelling across Ireland, from the coast of Down to that of Donegal, and caused similar lines of levelling to be observed in other places. The result was, to furnish a more general and homogeneous series of altitudes than had ever before been accomplished. It is true that even the accuracy thus obtained proved insufficient for those increasing wants and that improved knowledge which the scientific works of the day soon afterwards called for, though his contributions went far beyond the original intention and requirements of the survey as contemplated by Parliament. Those wants were also met and supplied in Ireland by an elaborate system of special spirit-levelling, crossing the island in every direction, and terminating at stations on the coast, where tidal observations were simultaneously made. These observations were thoroughly executed by Captain Cameron, who had been trained chiefly under Portlock; and they furnished the material for the admirable paper by the Astronomer-Royal, published in the Transactions of the Royal Society of London.

The triangulation and altitudes of all Ireland being completed, Portlock was employed to carry out the views which Colonel Colby had formed at the commencement of the survey in regard to a

geological survey of Ireland, but which the more pressing wants of the topographical branch had caused to be suspended. For that work, on which Portlock's abilities might have been equally developed, the time was past for making it a part of the survey, and, after a single volume had been published, other public arrangements were made, and the Geological Survey of the British Isles was established under Sir Henry de la Beche. It is, however, my bounden duty, as a geologist, to state that this volume of Portlock on the geology of Londonderry is a perfect model for fidelity of observation and minute attention to phenomena.* To the quickness of his eye, and his resolution to surmount difficulties, we also owe the first detection in Ireland (Tyrone) of those trilobites and other organic remains which enabled him to identify those rocks with the Silurian rocks of England and Wales very shortly after my first classification of these older palæozoic rocks. In short, he not only described the physical and mineralogical features of those tracts, but even so correctly described and named all their imbedded organic remains, that his work will always be considered one of those stock pieces of science to which geologists are largely indebted. On many occasions, as he rose in rank from captain to field-officer, Portlock showed, not only so a great a love for geology, but also so true and solid an acquaintance with the science, that in the years 1857 and 1858 he was elected to occupy the chair of the Geological Society of London; in which he was not only distinguished for his sound judgment and courtesy as a President, but also for the faithful and elaborate research shown in his Anniversary Addresses. He was, in truth, a geologist quite after my own heart; for in him an acquaintance with rocks, minerals, and fossils was united with the full knowledge and feeling of a true physical geographer.

When his duties as a trigonometrical surveyor were completed, Portlock reverted to the active military duties of his corps, and was employed as Commanding Engineer at Corfu in the erection of the fortifications now in process of demolition. Afterwards he commanded the Engineers at Portsmouth and at Cork. In 1853, much to his honour, he wrote a memoir of the life of his old chief in the Ordnance Survey, General Colby, whose modesty had prevented his rendering justice to himself, who had done so much and

* In 1858, Portlock acted as President of the Geological Section of the British Association at Belfast.

said little of his deeds. Subsequently General Portlock became the Inspector of Studies at the Royal Military Academy at Woolwich; and, lastly, a member of the Council of Military Education. Failing health—the result, doubtless, of his extraordinary labours—bringing on paralysis, and compelling him to resign the last-named office, he returned to a pretty spot near Black Rock, Dublin, called Lota; where, soothed by the attentions of his devoted wife, he died on the 14th February, 1864.

For much that is given in this sketch of my lamented friend I am indebted to his distinguished brother Engineer officer Major-General Sir Thomas Larcom, with whom I cordially agree in thus summing up our estimate of the man:—"The characteristics which shone forth in Portlock during his well-spent life, whether as a soldier, a geographer, or a geologist, were,—undaunted courage in facing difficulties, Spartan endurance and invincible perseverance in overcoming them. Endowed, when in the zenith of his career, with a frame and nerves of iron, he exhibited such a vast power of continuous labour that he achieved every object he had in view; whilst great ability and a pure love of knowledge were in him guided and governed by the highest sense of honour and moral rectitude."

General Albert de LA MARMORA.—Our list of Foreign Members has in the last year been deprived of the name of one of those brave soldiers of whom Italy has reason to be proud, and who, in the latter part more especially of his distinguished career, has been a most devoted and successful contributor in the advancement of geography. Albert de La Marmora, who died last year at Turin in his 75th year, and was born at the same place in April, 1789, was the second born of eight brothers of an ancient noble family, four of whom became distinguished General Officers. Entering the military service when the North of Italy was united with France under the First Napoleon, his education was completed at the Military School of Fontainebleau, in which he was well instructed in mathematics by the famous Puissant. After some years of local adventure he served in the army which, advancing from Italy, retrieved the defeat of Aspern; and he fought in the great victory gained by the first French Emperor at Wagram. Although a serious malady compelled him to leave the army in 1811, he was called again into activity, and, taking part in the battles of Lutzen and Bautzen, he obtained the Cross of the Legion of Honour. He was also engaged in the disastrous battles of Gross Beeren and Leipzig; and, when the

star of Napoleon set in 1814, La Marmora, returned to his native city, still holding, after eight years of hard service, the rank of Lieutenant only. Our own fine old soldier, Lord Clyde, was, in a similar way, long an unknown brave subaltern.

In the year of peace which followed the short war of 1815, his active spirit led Albert de La Marmora into liberal demonstrations, which caused him to be exiled to the Island of Sardinia. This event, which seemed untoward, proved however to be most beneficial to geographical science. It threw this zealous man upon his own resources, and he began to work out the geography of an island, which, though it gave for a long period a title to a crowned head, had been hitherto quite misrepresented in the scientific maps of European countries. In subsequent years, regaining his freedom and proper position, he advanced to higher rank and occupied public stations of importance; among which was the Directorship of the Royal Naval School at Genoa. An active adherent of the gallant but unfortunate Charles Albert, he received from that King, shortly before his abdication, the rank of Lieutenant-General; and under the present King of Italy was decorated with high honours.

Having thus briefly sketched his public career, it is now my duty to unite, as your representative, with the Geographers of France and Italy, and I trust of every country of the civilized world, in doing honour to the memory of the man who devoted his best energies for many years to the completion of that beautiful map of Sardinia, for the construction of which we placed him in the list of our Foreign Members. This work is not only an example of accurate and skilful workmanship, in the representation of a tract highly diversified in outline, but has been admirably illustrated by the well-filled volumes which he published on the Natural History, Antiquities, and Geology of his favourite island, so that the labours which he commenced in 1819 were not really terminated until 1860. Whilst my eminent contemporary M. d'Avézac, in his Address to the Geological Society of France, speaks with the warmth of a friend and admirer of General Albert de La Marmora for his description of the Antiquities of Sardinia, let me assure you that at a late period I also rejoiced to converse with the deceased General, when I found that he was as zealously intent upon doing all justice to the geological structure of the island. Not content with consulting M. de Verneuil and myself as to the age of the rocks he was describing, he employed competent persons, particularly M. Vecchi, in drawing and describing all the fossil organic remains. In short, he has by

his encyclopædic and praiseworthy labours so united Sardinia with Piedmont, as thereby to constitute the strongest reason, independent even of the rights of regal inheritance, why the race of inhabitants of that fine island should never be severed from the Italian kingdom. It is as a benefactor to humanity in its widest sense that the memory of this true devotee to the cause of science and letters will be preserved to future ages, when the names of many a greater official personage of our time will have passed into oblivion.

The Earl of ELGIN and KINCARDINE.—The late Earl of Elgin was a Fellow of our Society, and it is but a brief time since you heard his voice in this room, unostentatiously describing the results of those great events which have revolutionised the relations between the European world and the most remote and most civilised empires of Asia. The late Earl, born in 1811, was educated at Eton and Oxford, and was the friend and contemporary in years with such statesmen as Lords Dalhousie and Canning, and William Gladstone.

With a slender patrimony, and no other advantage to begin life than an ancient Scot's pedigree, Lord Elgin fought his way to eminence by force of talents, assiduity, and integrity, and was truly the builder of his own fortune and renown. Diplomacy was the branch of administration, including colonial administration, in which he rose; and here, from the magnitude and importance of the transactions in which he happened to be engaged, but still more from the skill with which he conducted them, he is entitled to rank among the first diplomatists of our time. His first responsible office was that of Governor of Jamaica, from which he was transferred to the more important and difficult office of Governor-General of Canada, which he discharged with skill and efficiency, conducting to a successful issue those negotiations with our frontier relatives, which, founded on the solid bases of freedom, justice, and equality, ought to insure peace and contentment to the parties concerned. But by far the most valuable services which Lord Elgin rendered to the State were those which he achieved in China and Japan. The first mission to China began in 1857, and lasted two years; the second began in 1860, and terminated in the same year; so that in all, between China and Japan, he passed three years of most laborious and responsible employment. This successful diplomacy has thrown open to us four new ports in China, and as many in Japan. You can judge to what extent we are already profiting by his Lordship's services, when I state that the value of the exports and imports of Britain and her Colonies with the two empires already reaches the yearly sum of 40,000,000*l*.

Such services as these will assure to Lord Elgin a record in our national history.

The operations which have led to these great results gave the Earl of Elgin an opportunity of displaying that self-reliance, promptitude of action, and political courage, which eminently distinguished his character. The news of the outbreak of the great Indian rebellion having reached him on his route to China, he at once appreciated the extent of the danger, and, on his own responsibility, diverted the whole naval and military expedition from its original destination. By his command, the force which was meant for the Peiho proceeded to the Ganges, and largely contributed to the suppression of the insurrection; for it was in time, not only for the protection of Calcutta, but for the capture of Lucknow. In this last crowning achievement, performed at the distance of 600 miles out of the bounds of their own special element, even the Navy took part; for who can forget the part played in it by the gallant William Peel and his sailors?

Shortly after his return from China, Lord Elgin was promoted to the most lucrative, but also the most difficult and responsible, office under the Crown—the Government of India; and assuredly none of his predecessors brought to it so large and various a practical experience, while in talents he equalled the most distinguished of them. Had his life been spared, his talents, energy, and industry would have been equal to the cultivation of the grand field which was now opened to him. He proceeded to India in 1861, and died at his post in 1863, at the age of 52, much too early for his country and his friends; the malady which proved fatal to him being an organic affection of the heart—without doubt, the effect of long, laborious, and anxious public services on a peculiarly sensitive constitution.

In dying at his post in India, this eminent public servant was spared the misery which befell his predecessor, Lord Canning, in the loss of his wife; for, happily, the accomplished Countess of Elgin, who had devotedly followed her lord to the East, has survived, and will doubtless so bring up her children as to lead them to emulate the great deeds and virtuous life of their noble parent.

The death of the Admiral of the Fleet brings me to notice, however briefly, one of the distinguished seamen of Nelsonian days. Sir W. HALL GAGE, G.C.B., entered the Navy in 1789. He was present as Lieutenant of the *Minerve*, under the command of Lord Nelson, when that vessel captured the Spanish frigate *Sabina*. He next took

part in the cutting-out of the *Mutine* from under the batteries at Teneriffe. When in command of the *Uranie*, the boats of that vessel, in company with those of the *Doris* and *Beaulieu*, cut out the French National ship *La Chevette*, of 20 guns and 350 men, which was considered one of the most brilliant exploits of the kind ever performed. He served as Commander-in-Chief in the East Indies from 1825 to 1830, and on the Lisbon station from 1834 to 1837; and from 1842 to 1846 he acted as Senior Naval Lord at the Board of Admiralty. Sir William joined the Royal Geographical Society in the year 1845.

Rear-Admiral Octavius VERNON HARCOURT, fourth son of the late Archbishop of York, entered the Navy in 1803, and in the *Calcutta* performed a voyage round the world in 10 months and 3 days, which at that period was thought a very remarkable feat. He served as a Lieutenant in 1809, in the *Baltic*, with distinction; and in 1813, when in command of the *Challenger*, took part in the siege of San Sebastian, and afterwards commanded the *Blossom* and *Doris* on the South American station. Admiral Harcourt took an active interest in many charities, and at his death bequeathed a large sum of money for their maintenance.

Rear-Admiral FOWLER entered the Navy in 1793, and sailed as Lieutenant with Captain Flinders on a voyage of discovery to New Holland. He was afterwards wrecked on the Cato Reef, when in command of the armed storeship *Porpoise*; but he ultimately succeeded in reaching Canton, where he embarked on board the *Earl Camden*, East Indiaman. In consideration of the assistance that he afforded to Captain Dance in beating off the powerful French squadron under Linois, he was presented by the East India Company with a sum of 300*l.* to purchase a piece of plate, and the Patriotic Society awarded him a sword. He served in Sir R. Calder's action, 1805, and took part in the expedition to Walcheren, 1808.

Captain William ALLEN entered the Navy in the year 1805. He served in the *Standard* at the passage of the Dardanelles, under Sir Thomas Duckworth, and was engaged in the reduction of Java.

Captain Allen served in the *Wilberforce* steamer on her memorable expedition up the Niger, of which he published an interesting account; and in the year 1855 he produced a work in 2 vols. on the 'Dead Sea and the Overland Communication with the East.' In this he advocated the cutting of a canal so as to admit the Mediterranean into the Dead Sea, and entered extensively into a comparison

between this route and that by the proposed Suez Canal. Captain Allen took an active part in the proceedings of the Society, and spoke occasionally at our meetings.

Captain W. A. WILLIS entered the Navy in 1811. He served as Flag-Lieutenant to Sir G. Cockburn, in the West Indies, and afterwards in command of the *Jaseur* and *Frolic*; and in 1845 he was granted a pension for wounds received in the service.

Richard THORNTON.—I have now to speak of a gifted and promising young man, Mr. Richard Thornton, of Bradford, who has lost his life by his zealous exertions to extend our acquaintance with the geography and geology of Eastern Africa. I am proud to say that Richard Thornton received his scientific education in the Royal School of Mines, over which I preside, and that, being desirous of accompanying Livingstone in his last explorations, I confidently recommended him to the good will of the great traveller. When Livingstone last left our shores in March, 1858, young Thornton, then only nineteen* years of age, accompanied him as geologist. Qualifying himself during the voyage and at the Cape of Good Hope in making astronomical calculations, and being also a good sketcher of ground and capable of constructing maps, he was as well adapted to lay down the physical geography of the Zambesi River as to describe the various rocks which occupied its banks.

In looking over his accurately-kept diaries, in which he never failed to register every fact, I find that he made upwards of 7000 observations, to fix relative geographical points and to determine altitudes, on the banks of the Zambesi. In leaving the tertiary rocks of the Delta behind him, and in ascending that river to the rapids, he described numerous rocks of former igneous origin; and, still further inland, various seams of thick and good coal (of which the Portuguese may very largely avail themselves); proving, by the associated fossil remains, that the coal was of the old and best age of that mineral.

His health having failed, he was for a while estranged from the Zambesi expedition, through a partial misunderstanding between his chief and himself. This having been completely done away with, when my young friend returned to work out and complete his labours in the Zambesi region, I should not here allude to it, if not to recount the important services he rendered in the mean time to

* Born 5th April, 1838.

geographical and geological science, by becoming *ad interim* the scientific companion of Baron C. von der Decken, in his first survey of the Kilimandjaro Mountain, from Zanzibar and Mombas.

Having recently examined the diary kept by Mr. Richard Thornton in that journey between Mombas and the highest point the travellers reached, and also on their return to Mombas, or between the last days of June and the 10th of October, I have no hesitation in saying that the labour is so graphically detailed, every movement so accurately recorded, the transactions with the various native tribes so clearly explained, and every hour of the 120 days' expedition so well accounted for, that, with the contoured map of the region which he prepared, together with many sketches of the form of the ground, I can really fancy myself, like his leader and himself, struggling to reach the snowy equatorial summits. The numerous obstacles opposed by the native chiefs, and the manner in which, after so many "showrys" or palavers, all difficulties were overcome; the perfect description of the habits and dresses of the natives—of the metamorphosed structure of the rocks—the vegetation of each zone of altitude—all these are given; whilst every moment of clear weather in that humid region was devoted to star and lunar observations, or to theodolite measurements of altitude, and the fixing of relative geographical points. All this, too, was scrupulously performed by Thornton, notwithstanding occasional attacks of fever, to which the Baron and himself were subjected.

I cannot but hope that these diaries of an accurately minute philosopher, or at least large portions of them, will appear in print; for I have read few writings more instructive and characteristic. In fact, until Baron von der Decken and Thornton carried out this expedition, no other African traveller has ever had presented to him such a vast variety of scenes of nature, within so limited a compass, as those which are seen in ascending from the eastern seaboard to the banana-groves on the skirts of the snow-clad peaks of Kilimandjaro. As the account of this first ascent has been given to Continental Europe in German, so we may rejoice that our Thornton's English version of the same may soon appear; whilst Baron von der Decken, our Medallist of this year, unites with me in the expression of admiration of the undaunted efforts and able assistance of his companion.

In truth, in his letters to myself, besides what is noted down in his diaries, Thornton correctly described (and for the first time) the nature of each rock of that region; by which I clearly learned

that igneous rocks, whether syenites or porphyries, had penetrated micaceous slaty metamorphic strata, and that streams of vesicular lava, which occur on the flanks of the mountains, indicated clearly that the loftiest summits, now capped with snow, had been raised by the extrusion of a great subaërial volcano.*

If his life had been spared, this fine young man intended, as he wrote to me, to endeavour to traverse Africa, and compare its East and West coasts with each other, as well as with its vast lacustrine centre. Anxious, however, to finish off in the mean time those labours in the Zambesi which he had so far advanced, he rejoined his old chief Livingstone, and was on the point of completing the map of a mountainous tract on the north bank of the stream, when, in over-exerting himself, he fell a victim to that fever which has proved so fatal to our missionaries, to the devoted wife of Livingstone, and which, on more than one occasion, has nearly deprived of life that great traveller himself.

One of his companions for a time on the Zambesi, the Rev. Henry Rowley, in writing to me of the never-flagging zeal and unconquerable energy, as well as of the generous nature and high character of Richard Thornton, adds:—"Axe in hand, he would cut himself a path to the top of a thickly-wooded mountain, never leaving it till the setting sun made further observations impossible."

In reviewing the journals and diaries of Richard Thornton, I am lost in admiration of his patient labours of registration, when combined with his vivacity of description. With such a delineator in words as Thornton, and such an artist as Mr. Baines—who has sent home such admirable coloured drawings of South-African scenes, particularly of the falls of the Zambesi—those of us who are destined never to be able to penetrate into the southern part of Africa, may quite realise to our mind's eye the true characters of that grand continent. Through the devotion of the brothers and sisters of the deceased traveller, the whole of his voluminous notes and observations have, I am happy to say, been carefully copied out and transmitted to us; and I am confident that every one who examines them will declare with myself, that Richard Thornton was so gifted and rising an explorer, that, had he lived, his indomitable zeal and his great acquirements would have surely placed him in the front rank of men of science. He died on the 21st April, 1863, at the early age of twenty-five years.

* In the subsequent expedition, when Baron von der Decken reached the greater altitudes, he found in addition trachytes and obsidian.

E. Osborne SMITH.—By the decease of my respected friend, Mr. E. Osborne Smith, the Council has lost a valuable auxiliary, whether in the management of our finances, in preparing the annual Reports, or in every way rendering himself useful. Possessed of sound good sense, and endowed with a most genial disposition, he was truly an important link between the popular and scientific portions of our large body; and on numerous occasions was of real service in calming irritation and in promoting harmony and goodwill among us.

As the Treasurer of the Club of the Society, his cheerfulness and large-heartedness rendered him a general favourite; and all its members have united with me in deploring his loss, whilst they cherish the memory of his good deeds. He had been for many years the Actuary of the Reliance Life Assurance Company, which office gave him full opportunity of displaying his mathematical abilities; and it is believed that the laborious work of computing a long series of important and intricate calculations brought to a crisis the illness that terminated his well-spent and useful life.

Mr. Osborne Smith was a Fellow of the Society of Antiquaries, and also of the Zoological, Statistical, and Ethnological Societies; and was a member of Council in the two last bodies, as well as in that of our own Society. He died on the 25th April, 1864, in the sixty-fifth year of his age, deeply regretted.

Beriah BOTFIELD.—Beriah Botfield, M.P., was a man of cultivated mind, who expended much of his large fortune in the promotion of antiquarian researches, and in the publication of literary works of merit. The chief of these works are—various Tracts upon Bibliography, communicated to the Philobiblion Society; Prefaces to the first editions of the Greek and Roman Classics, and of the Sacred Scriptures; Stemmata Botevilliana; Expenses of England in the 13th and 14th centuries; and Notes on the Cathedral Libraries of England. In addition to these, Mr. Botfield made various communications to the Society of Antiquaries, which have been duly noticed by the President of that body, Earl Stanhope.

William CUBITT.—William Cubitt, M.P., was one of the most marked of that class of good and earnest men who, owing their success in life to their own exertions, rise to posts of distinction. He began life as a seaman; but in due time, following the bent of his genius, he studied architecture, and became a most successful builder. In truth, William Cubitt was the architect of his own fortune. He rose to the loftiest civic dignity of these kingdoms, attaining at the same time a seat in Parliament. Mr. Cubitt was so justly popular, and so much esteemed for his good sense, probity,

and engaging manners, that he was twice chosen Lord Mayor of London, and died infinitely regretted by a large circle of friends and admirers.

John Watkins BRETT.—Though not the scientific originator of submarine telegraphy—an honour which was won by Professor Wheatstone*—Mr. Brett was distinguished by being the first to show, by the actual experiment of laying a gutta-percha wire across the British Channel, in 1850, that the scheme was feasible. He had indeed called the attention of Government to the subject in 1845, with the view of connecting Britain with her colonies. He afterwards (1846-7) endeavoured in vain to carry out his project under the Government of Louis Philippe, though he had obtained a concession. At last, through his energy and ability, he obtained a renewal of the concession from Louis Napoleon; and in 1850 an experimental line was submerged by Mr. Brett between Dover and Cape Griznez, by which the *first* submarine message was sent from one country to another; 'The Times' of the day remarking, "the jest of yesterday has become the fact of to-day." The present cable between Dover and Calais was laid in 1851, and the Dover and Ostend line in 1853; the latter under a concession from the King of the Belgians. The next trial was in the unknown depths of the Mediterranean, under concessions from the French and Sardinian Governments, and resulted, in 1854, in uniting the Island of Sardinia with the Continent of Europe. It would be superfluous to trace further Mr. Brett's connexion with telegraphic enterprise: suffice it to say, that in 1856 he was mainly instrumental in forming the Atlantic Telegraph Company, of which he was one of the directors. It is rare to find a highly cultivated taste for the fine arts combined with an enterprising mind, yet such was eminently the case with Mr. Brett, as proved by his well-known, choice and varied collection of works of art. Mr. Brett died on the 3rd of December last, at the age of 58, bequeathing one-tenth of his large property to charity.

C. G. PULLER.—C. G. Puller, Esq., a respected friend of my own, was one of the representatives of Hertfordshire. He was a conscientious, enlightened, and zealous Member of Parliament. He died most unexpectedly, after a very short illness.

Arthur PAGET.—Mr. Arthur Paget, the heir of a great estate, was

* From the year 1840 onwards Professor Wheatstone familiarized the public with the feasibility of Submarine Telegraphy. I have before me documents which leave no doubt on this subject, and a jury of the International Association at Paris in 1855 unhesitatingly assigned this scientific honour to Wheatstone.

too early cut off: in the spirit of adventure and from love of geographical pursuits, he had visited America, the Pacific Islands, Continental India, Java, with others of the Malayan Islands, and Northern Africa. In China, during our last operations against the Imperial Government, he served as a volunteer, sharing in the perils and privations of his military companions.

The other deceased Fellows, who have not taken a prominent part in our proceedings, or have been noted as authors or public characters, are—Mr. Henry Ancell; Mr. Thomas Blackwell, an able Civil Engineer; Mr. David Barclay, Mr. William Jackson, Mr. George Lee, Mr. Thomas Molson, the Rev. W. Oxenham, Mr. Thomas Parr, the Rev. G. C. Rowden, Mr. John N. Ryder, Mr. W. Richardson, and Dr. Tronson.*

BRITISH GEOGRAPHY.

Admiralty Surveys.†—The Admiralty Surveys at home and abroad have made adequate progress during the past year, although, owing to the completion of some Coasts, and the retirement of officers, certain reductions have taken place.

English Coast.—Staff-Commander Calver, in the *Porcupine*, has re-surveyed the estuary of the Thames, a work which, owing to the shifting nature of the sands, was much required. He has sounded over an area of 240 square miles, and will, during the present year, continue to trace the changes to the north-east, along the coasts of Suffolk and Norfolk, till they disappear. The ever-changing character of the sands off these shores, and especially in the vicinity of Yarmouth and Lowestoft, calls for continued activity on the part of our Surveyors; and under the skilful and energetic superintendence of the officer charged with this service it is hoped that all the requirements of navigation, vast as they are, will be fully provided for. Captain George Williams, in the *Bann*, has completely re-surveyed and elaborately sounded the Scilly Islands, within a radius of 10 miles: his soundings cover an area of 550 square miles. During the present season he will be employed in completing the deep-sea soundings on the south coast of England, between the Eddystone and Portland. Commander George M. Alldridge, in the *Asp*, has

* I have learnt, too late for notice, that General Monteith is dead. The labours of this experienced geographer must be recorded next year.

† As prepared by the Hydrographer, Capt. Richards, R.N.

surveyed Caermarthen Bay, with the rivers Taff and Towey; thus completing the north shore of the Bristol Channel. This officer, after a long, active service, extending over thirty years, has retired, with his promotion, and has been succeeded by Commander David Aird, who during the present season will continue the sounding of the southern shore of the Channel, between Minehead and Hartland Point.

The Survey of the Western Hebrides, under Captain Otter, is satisfactorily completed; and no delay will take place in the publication of this important part of the Scottish seaboard, on a scale commensurate with all the requirements of the seaman. There remains now to complete the entire western coast of Scotland but a small portion of the Island of Tyree, Skerryvore, and its off-lying dangers, with the deep-sea soundings in the same neighbourhood, which, under the direction of Captain J. E. Bedford and Mr. Stanton, will no doubt be brought to a close by the end of this year.

Captain Bedford and his Assistants, during the past season, have surveyed 142 miles of the exposed coasts of Coll and Tyree; and sounded over an area of 137 square miles, besides other details.

Commander Thomas has completed the shores of Benbecula and Harris, and retires with promotion after a long and unbroken period of active service of over thirty years.

The Survey of the Channel Islands, under Staff-Commander John Richards, has made good progress during the past season, and is being continued with that care and minuteness which a coast-line beset with so many hidden dangers necessarily requires.

Mediterranean.—The Surveys in this sea and the Grecian Archipelago, under Captain Spratt, C.B.,* and Commander Mansell, have steadily progressed during the past year. The examination of the different banks in the Malta Channel, the Survey of Tripoli, and the Island and Channel of Corfu, are among the most important works which have been completed. It will be learned with regret by all geographers that Captain Spratt, who has passed the greater part of his professional life in the active duties of the Mediterranean Survey, and for the last twelve years most ably conducted it, has resigned his important command. The records of this Society have year by year feebly recorded the benefits which have been conferred

* No stronger proof of the high estimation in which Capt. Spratt is held by men of science and art can be given, than that he was last year selected as the first out of many candidates in the list of the nine persons who are annually admitted into the Athenæum Club as "*eminently distinguished* in science, letters, and the arts, or public service."

on science and navigation by the energetic labours of this talented officer; but his works themselves will remain an enduring monument of his skill and industry for ages yet to come.

Commander Mansell, the late coadjutor of Captain Spratt, has taken his place; while Lieutenant-Commander Wilkinson has succeeded to that of Commander Mansell.

Newfoundland.—Captain Orlebar, with his Assistants, has surveyed 114 miles of the eastern coast of Newfoundland, between Cape Race and Cape Spear, including plans of several bays and harbours, and has sounded over an area of 1330 square miles: his work is in process of engraving.

Nova Scotia.—The examination of this coast, under Captain Shortland, is rapidly drawing to a close. During the past season 125 miles of sea and harbour shores have been completed, and 177 square miles sounded over.

West Indies.—The West India Survey, under Mr. Parsons, includes during the last year portions of the Islands of St. Vincent, Antigua, and St. Lucia. Mr. Parsons has now commenced the examination of Grenada.

Bermuda.—In consequence of the increased draught of our modern ships, and in order to ascertain whether any alteration has taken place in the depth, consequent on the growth of the coral, it has been considered necessary to make a re-examination of some of the narrow and intricate channels leading to this important depôt; and Captain Pullen is now employed on this duty.

Vancouver Island.—It was announced in our last Annual Report that the Survey of this important island, with the adjacent coast of British Columbia, had been completed. The *Hecate*, lately engaged on this duty, has arrived in England, and the work has been deposited at the Admiralty, by whom it will be published for the benefit of navigation without delay. The fruits of this Survey are already apparent in the rapid development of the resources of this region as a coal and timber producing country, and also of its fisheries. A company is incorporated for the establishment of a graving-dock in the harbour of Esquimalt, which will have the effect of drawing to the shores of this rising colony the ships of all nations from one end of the Pacific to the other. The Survey of the northern shores of British Columbia is being continued by Mr. Pender, late Chief-Assistant in the *Hecate*, who, with an able staff, has already made good progress with the work.

Australia.—Under the combined efforts of the four officers in

charge of the different Surveys, considerable progress has been made in the delineation of the shores of this great country; the expenses being borne equally by the Colonies and the Home Government.

Commander Hutchisson, in South Australia, has completed the upper portion of Spencer Gulf, including 167 miles of coast, and has sounded over 964 square miles. He was, in his little vessel of 100 tons, to leave South Australia, and, passing round the eastern coast, by Torres Strait, take up the examination of the northern shore about Cambridge Gulf, that coast having lately been added to the territory of South Australia.

Commander Cox, in Victoria, has completed the Survey of Port Phillip and its approaches, but has been considerably retarded in his little vessel, of 65 tons, by the furious gales with which this part of Australia was visited during November and December, 1863. On the coast of New South Wales, the Survey under Commander Sidney is proceeding as rapidly as the means at his disposal will allow; but in consequence of the wreck of H.M.S. *Orpheus* at the entrance of Manukau Harbour, in New Zealand, he was directed to proceed to that colony and make a re-survey of the dangerous bar of that harbour. This duty Commander Sidney has effected, and returned to his survey in Australia. The new Survey of the Manukau Bar is in course of publication.

Mr. Jeffery, in Queensland, has surveyed part of Hervey Bay and the entrance of Mary River; and, now that he has been provided with a suitable vessel, no doubt the examination of the sea-coast of this thriving colony will advance rapidly. But by far the most important event which has occurred in the annals of Queensland is the establishment of the new settlement at Cape York, in Torres Strait. The Government have lately dispatched a small detachment of Royal Marines to commence this work; and H.M.S. *Salamander* has been also sent from England to aid in the enterprise.

Under these favourable circumstances, coupled with the daily increasing prosperity of Brisbane, and the rapid extension of the white population towards the north, we cannot doubt but that the whole eastern coast of Australia will ere long be opened up to navigation and commerce. In truth, we are now beginning to reap the fruits of those long years of toil and industry—the rewards of that skill, patience, and perseverance which produced to the world the magnificent survey of 800 miles of channels within the reefs of this coast; a survey which, when commenced, must have appeared

almost a hopeless undertaking, but which has led to the opening of a safe highway, soon to become the beaten track between India and Australia. In connection therewith, let not the names of King and Blackwood, and Owen Stanley, be forgotten: well may the companions of these gifted men, who still remain, feel proud to have participated in a work which will ever remain a monument of their perseverance and their skill, and among Nautical Surveys will stand unrivalled.

China and Japan.—The opening of new ports and the rapid extension of the world's commerce with these countries have taxed to the full the energies of our Surveyors during the past year.

The *Rifleman*, under Mr. Reed, has been employed in defining the limits of the great central reefs which encumber the China Sea, and in clearing the two highways from Singapore to the north, viz. the N.E. and Palawan routes. This is a most important work, not only involving much time, but the greatest care and vigilance: real dangers have been correctly placed, and many imaginary ones, hitherto a source of constant anxiety to the seaman, have been expunged from our charts. Still much remains to be done in both these great thoroughfares before they can be pronounced free from danger. It is with regret we learn that Mr. Reed has been compelled through ill health to resign the command of this portion of the China Survey, which he has conducted with so much energy and ability. He has been superseded by Commander Ward, the officer who formerly commanded the *Actæon*, engaged on a similar duty.

The *Swallow*, under Mr. Wilds, has been employed in the northern portion of the Chinese waters. Its commander has made new chrometric measurements between Hong Kong, Shanghai, Nagasaki, Yokuhama, and the Korea, and surveyed 700 miles of coast-line, including part of the Korean Archipelago; Chin Chu Bay, on the south coast of Shan-tung; also the harbour of Amoy, a good plan of which was much required.

The re-survey of the estuary of the Yangtsze Kiang is now in course of progress, great alterations having taken place in its shoals since the Survey of Captain Collinson in 1842.

During the year 1863 twenty new Charts have been published by the Hydrographic Office of the Admiralty, besides numerous additions and corrections to others. The number of Charts printed during the same time has amounted to 150,517. Tide Tables have likewise been prepared by Staff-Commander Burdwood for 3000

places. Sailing Directions have been prepared by various officers : for the South and East Coasts of Africa, by Captain de Horsey, R.N. ; for the Persian Gulf, by Captain Constable and Lieutenant Stiffe, of the late Indian Navy ; and for the Gulf of Aden and East Coast of Arabia, by Commander Ward, late Indian Navy. A fourth edition of the 'China Pilot' has also been issued. This work has been thoroughly revised, and much additional information introduced from our late Surveys of the Coasts of the Yellow Sea, the Gulfs of Pe-chili and Lian-tung, the Sea and Islands of Japan, by Staff-Commander King. The 'South American Pilot,' Part 1, is just complete, and contains directions for the Eastern Coast of America, from Cape St. Roque to French Guayana, by Staff-Commander Penn.

Various other books of Sailing Directions are being revised or brought out anew, with all the dispatch which the means at the disposal of the department will permit, and the interests of navigation so urgently call for. Lighthouse Lists for every coast have also been published under the direction of Commander Dunsterville, R.N. ; together with Hydrographic Notices of newly-discovered Rocks, Shoals, &c., with other information useful to navigation in general.

ORDNANCE SURVEY OF THE UNITED KINGDOM.*—The Plans of the six Northern Counties of England having been drawn on the large scales of 25 and 6 inches to the mile, have been reduced to and engraved on the scale of 1 inch to a mile ; and although the engraving of the hill features upon a few sheets is not yet finished, the Map of England and Wales, for all practical purposes, may be said to be finished and published. The 1-inch map of Ireland, in outline, reduced from the 6-inch plans, has also been engraved and published ; together with many of the sheets with the hill features represented.

In Scotland the survey of Buteshire, Forfarshire, and Kincardineshire, on the large scale, was finished during the last year, and considerable portions of Aberdeenshire and Argyleshire have also been surveyed. All the southern portion of Scotland, including Perthshire and Forfarshire, has been engraved and published on the 1-inch scale. The principal cultivated district of Scotland remaining to be surveyed extends from Peterhead to Inverness ; and for the purpose of expediting the work in this quarter, officers are stationed

* Prepared by Colonel Sir H. James, R.E.

at Aberdeen and Inverness, and another will shortly be sent to Banff. The importance of proceeding also as rapidly as possible with the survey of the Highlands, is now fully recognised; and rooms have been prepared at Fort Augustus to receive another officers' party.

The publication of the Reports of the Royal Commission, and of several Select Committees of the House of Commons, has had the effect of fully enlightening the public as to the importance of having a complete cadastral or large survey of the United Kingdom. Last year Her Majesty's Government gave directions for the whole of England and Wales, south of Yorkshire and Lancashire, to be re-surveyed, and the plans drawn on the scales of 25 and 6 inches to a mile, like those of Scotland; and the first vote for proceeding with this great work was passed by the House of Commons this year without opposition; but with an objection, on the part of some Members, to the insufficiency of the amount voted for prosecuting the survey with the rapidity which is desired.

The principal triangulation, and the initial levelling of the United Kingdom, have been published; and the Survey Department is therefore in a position to proceed with the detailed survey in any part of England and Wales. During the last year the survey of Middlesex was finished, with the exception of the detail-plans of the city of London, which has already been published in outline, and large portions of the counties of Surrey, Kent, Essex, Devonshire, Cornwall, and Hants have also been finished. The estimated cost of completing the Cadastral Survey of England and Wales is 1,400,000*l.*; but with a grant amounting only to 75,000*l.* for England, Ireland, and Scotland, or about 25,000*l.* for England and Wales, it is obvious that the means is very disproportioned to the magnitude and cost of the work.

The extension of the Triangulation of the United Kingdom into France and Belgium was published in 1862. This was undertaken for the purpose of connecting our triangulation with that of Europe, so that we now have a connected triangulation extending from the West of Ireland to the Ural Mountains, and the data for completing an arc of parallel in the latitude of 52° N., extending over about 72° of longitude. Operations are now in progress for determining the difference of longitude between selected stations along the course of the arc; and as, on account of the "personal equation" of every observer, it is necessary that the same individual should be employed at every station, the Russian officers, Colonel Forsch and

Captain Jilinski, of the Imperial Staff, who commenced their observations at the eastern extremity of the arc, are now working their way westward, and are expected to arrive in this country to observe at Greenwich, Milford, and Valentia in July next.

The publication of the facsimile of Domesday Book by the Photozincographic process was finished last year. The original MSS. are contained in two volumes, designated 'Great Domesday Book' and 'Little Domesday Book,' containing 760 and 900 pages respectively. The facsimile has, with one or two exceptions, been published by counties, in 32 volumes, and 10,280 volumes have already been printed. This copy of the Great Survey of the Conqueror has been received with great satisfaction by the public; and the production of a series of County Maps, showing the position of the several manors or properties mentioned in it, is now contemplated.

GEOLOGICAL SURVEY OF THE UNITED KINGDOM.—Besides an enumeration of the new geological maps which have been published in the last year, of the Southern and Central Counties of England, and large portions of Ireland and the South of Scotland, I have explained in my Report to Parliament, that in the coming years a sufficient number of surveyors will at once be employed in working out the structure of the North of England. Whilst it is an obvious duty of the Geological Survey to develop the great mineral resources which exist in the northernmost English counties, the public must recollect that the Ordnance Maps of that region, on which alone our work can be carried out, have only recently been brought towards completion. Until this was effected, I deemed it to be highly desirable to finish off the geology of the districts around the metropolis, particularly with a view to the greater supply of water for a vast population from subterranean sources. Now, however, that these southern districts have been geologically surveyed, no time will be lost in applying vigorously to the North the same processes as those by which the structure of Wales and the southern and central counties of England has been eliminated. In a few years, therefore, I hope to see maps and sections published which will fully illustrate the older rocks of the lake regions of Cumberland and Westmorland, as well as of the rich coal-fields of Yorkshire, Durham, and Northumberland.

NEW PUBLICATIONS.—In respect to the publication of works on geographical subjects within the last two years, I cannot pretend to have a due acquaintance with many of them. The most remark-

able maps which have come into our possession have been mentioned in the Report of the Council; and a certain-number of those which have been published abroad will be further alluded to in what I have to say on various foreign countries. In addition to these, some of the maps and original articles in Petermann's 'Mittheilungen' may be passed in review in this place. I would more especially mention the articles by the accomplished editor, on the physical and statistical survey of the Austrian Empire, illustrated by nine coloured maps: Sartorius von Waltershausen's survey of Etna, with a topographical map printed on the same sheet with a map of Kilimandjaro, as surveyed by Baron U. von der Decken; the two being given on the same scale to facilitate comparison between the two mountains; the articles by Petermann on the sea-bottom of the British seas and the cartography of the Mediterranean, as delineated in the excellent maps of these regions in Stieler's Atlas; and, lastly, the maps in illustration of the geographical and other results of the Swedish expedition to Spitzbergen. With regard to British publications, there remain a few which seem to me to deserve a passing commendation in this Address.

The Index Geographicus of Keith Johnston; or an Alphabetical List of the principal places on the Globe, with the latitudes and longitudes, is a most useful addition to every good library.*

Phillip's New Imperial Library Atlas, edited by Messrs. Bartholomew and Hughes, Fellows of our Society, is a clearly-defined and attractive work. The chromo-lithographic colouring of the maps is effective, and the divisions are not obscured by the insertion of too many names. The accompanying Index Geographicus at once enables the reader to find any place on the map.

A work about to appear has just been put into my hands, entitled 'A System of Universal Geography,' by Dr. Muir of Glasgow, one of our youngest and most industrious Associates. It forms a large volume, and conveys in a compendious style some of the latest information on the various countries of the earth. From its plan of arrangement the work appears to combine the advantages of a gazetteer and those of a text-book for schools and families.

Mr. Murray has just published two volumes of the Travels of M. Mouhot, by his widow, a descendant of Mungo Park. The travels are in Siam, Lao, and Cambodia, and have near 100 beautiful illustrations: they describe the most remarkable ruins of temples and palaces which have ever been discovered, comparable only for

* Blackwood and Sons.

magnitude to the Pyramids and temples of Egypt. The book is dedicated to the Royal Geographical Society.

Mr. William Simpson, one of our Fellows, who has spent much time in delineating the natural features of Upper India, the Himalayas, Tibet, and Cashmere, has brought home a series of coloured paintings of great beauty, which, I hear, are about to be published. The sources of the Ganges and the Jumna, the fine scenery of Rajpootana, and the Falls of Gairaoppa, in Mysore, are as strikingly represented as numberless buildings are elaborately and artistically worked out.

Among the elementary publications, I may direct attention to an useful little work, by the Rev. Alexander Mackay, entitled 'Elements of Modern Geography.*' In a former Address I ventured to commend the 'Manual of Geography,' by the same author; and the present production is an improved and careful epitome of that work, which can be recommended as a text book to be used in the educational establishments of the country. Considering that the author is—as I know myself—actively employed as a minister of religion in the heart of Aberdeenshire, remote from access to libraries and the great marts of knowledge; I cannot but admire the assiduity and research displayed in the preparation of this elementary treatise.

Foreign Cartography.—On the detailed progress of Cartography in foreign countries I must delay the attempt to give a *précis*, except with respect to Russia; and on the great strides made by the geographers of that empire I will presently dilate. It is, however, my duty to notice, that though engaged in a gallant and strenuous defence of their country, the Government of the ancient kingdom of Denmark did not omit to comply with our request, to transmit to our Society all the sheets of their Topographical Survey up to the time of their presentation.

Of these maps, which when completed will number seventy sheets, about one-fourth are already finished and in our possession, and I can truly say that I never saw more beautiful specimens of cartography. They embrace many details, more, indeed, than those of our own Ordnance Survey on the small scale, and are usefully combined with hydrographical charts on the same scale, exhibiting the soundings and sand-banks; an agreeable effect being produced by slightly tinting the water. Even on the scale of $\frac{1}{62500}$, or one inch to a mile

* Blackwood and Sons.

and a quarter, all the elevations are delineated by contour lines, their height in feet being given. Not only are the houses and farmsteads marked, but also the minor enclosures and wooded and marshy tracts; so that this map may be favourably compared with any work published by other and larger nations. Several excellent geological maps accompany this valuable donation to our Map Office.

It also gratifies me to place on record a kind act of the Government of Copenhagen in acceding to a request I recently made through his Excellency the Danish Minister, M. Bille, when the Elbe was blockaded, to grant a passport to the ship in which the river steamer of our Medallist, the Hanoverian Baron C. von der Decken, is to be translated from Hamburg to the East Coast of Africa. The passport was at once sent, for happily scientific explorations were considered as sacred by the Danes as they were by the French when the Austrian frigate *Novara* was circumnavigating the globe during the Crimean war.

We have to thank the Prussian Government for transmitting to us the detailed map of the course of the Weser, from its sources to its mouth. This map is on twenty-one sheets, on the scale of $\frac{1}{100,000}$, or three miles to an inch.

Lastly, from Switzerland our excellent correspondent, M. Ziegler, has transmitted for the Society a copy of the maps recently published by the Federal Post-office department; representing the railways, postal routes, and telegraph stations of the Confederation. The maps are accompanied by a table of distances between the towns, and are remarkably clear and well executed. The important question of the determination of heights in Switzerland has much occupied the attention of Swiss geographers, and a committee has been appointed by the Federal Government to reconsider the subject, in consequence of the levelling of railroad lines having shown a difference of 2 to 3 metres from the determination as given in the official maps of General Dufour.

RECENT PROGRESS OF GEOGRAPHY IN RUSSIA.—Judging from the grandeur and importance of its operations, the Geographical Society of St. Petersburg may well be styled "Imperial." He who will peruse the *Compte-rendu* of the proceedings of that body, as ably prepared by the Secretary, M. Besobrasoff,* cannot fail to admire the wide and laborious surveys which have been effected, the number of valuable maps which have been prepared, and the various sciences

* Translated into French from the Russian.

affiliated to geography which have been enriched by researches amid regions hitherto for the most part unexplored by any traveller, and most imperfectly known to geographers. Founded on the model of our own Society so recently as the year 1846, the Imperial Society of St. Petersburg has now, indeed, become a most important body under the presidency of the Grand Duke Constantine, assisted by that enlightened nautical surveyor and circumnavigator Admiral Lütke.*

Whilst the practice in England, and our habits, have led us to separate ethnology and statistics from geography,—the parent Royal Society, the Linnæan and Zoological Societies, and the younger body the Ethnographical Society, gathering papers on the various subjects closely allied to geography,—the Geographical Society of St. Petersburg embraces all these cognate branches, and combines them with physical geography and travels; separate sections for each subject being organized with separate presidents, irrespective of the officers and council of the general body.

As I had the honour, when this Imperial Society was founded, of being named, in association with Humboldt and Ritter, one of the three first elected Foreign Honorary Members, simply because I had assisted in working out the structure of portions of that vast empire, I naturally take sincere pleasure in pointing out to my Associates the successful strides which this body has made, and particularly in the last few years, in extending our acquaintance with large portions of Northern Asia, as well as in the construction of accurate maps, and the diffusion of sound knowledge in statistics, natural history, and ethnology.

Independently of the justly famous measurement of an arc of the meridian from the North Cape to the Black Sea, carried out by the astronomers and surveyors led by Struve and Tenner, on which I have dilated on previous occasions, the geographical explorations of Eastern Siberia and the borders of the Chinese Empire have been so conducted as to throw quite a new light on the physical geography and natural history of those vast regions. These surveys were organized in so judicious a manner that they were almost certain to produce good fruits. Thus, while to M. Schwartz, of Dorpat, and his assistants, was entrusted the preparation of the topographical maps, to MM. Schmidt and Glehn were allotted all geological and mineralogical inquiries; whilst M. Radde, assisted

* Admiral Lütke has recently been advanced to the dignity of President of the Imperial Academy of Sciences.

by other able men, was responsible for the zoological and botanical departments.

With such sound pre-arrangements we need not therefore be surprised, that these explorers should have made observations which call for great changes in all pre-existing maps, and at the same time greatly enriched the domain of natural history. Among the most important of the new features which characterize these researches, and which are perspicuously pointed out by M. Besobrasoff, the following may be mentioned. The physical section of the East Siberian expedition has ascertained that many of the existing notions of the configuration of the vast basin watered by the great river Amur and its affluents are not only very inexact, but are often diametrically opposed to the truth. The connection, for example, of the lofty mountains proceeding from the eastern side of the lake Baikal, and called Yablonoy, with those termed Stanovoy on the north-east, has no existence. On the contrary, it has been ascertained that in this region, as in the interior of other continents (a phenomenon to which Humboldt first directed attention), the true parting of the waters often proceeds from comparatively low plateaux situated among much loftier mountains, through which the rivers escape in deep chasms. In this way the watershed of Eastern Siberia is found to proceed from the north of the lake Baikal, a little to the north of 56° N. lat., and to throw off the affluents of the Lena to the north, and those of the Amur to the south. We also learn that in a more eastern or lower portion of the great Amur, the chain of Burcia has a different outline from that which has been assigned to it. The sudden southward deflection of the mighty Amur from the Cossack station of Pashkoff is determined by a lofty mountain-ridge striking from east to west, and not from north to south, as formerly represented on maps. This stream has, in fact, found an issue by a profound fissure, with precipitous cliffs on either side, of which gorge it takes advantage. If we turn to the western portion of this region of Siberia, we find that there also researches have produced a great change in our previous knowledge. The form of the Saians Mountains, which range eastward from the Altai, has undergone considerable modification, as determined by the observations of Schwartz and Kryjine.

Practical cartographers will consult with much profit the maps, almost completed, of these hitherto ill-defined tracts, and geologists are awaiting the description of the rocks and their contents, whilst ethnologists are looking for accounts of those curious tribes of

Mongolian and Russo-Chinese Tartars, of which the late Mr. Atkinson and his relict have given us such lively sketches. In the mean time we may be quite sure that the splendid and abundant collections of animals and plants brought to St. Petersburg will be found to illustrate the direct dependence of the animal and vegetable products on the physical geography and climatology of the region. It is by such a well-devised and richly-endowed expedition as that of the Survey of Eastern Siberia that geography attains its highest distinctions; and I am sure that all those whom I address will rejoice with me, that a Society founded on our model should in so few years have attained a distinction which entitles it to the grateful thanks and approval of all geographers.

Whilst the Russian Geographical Society has thus carried scientific explorations, and applied its science to newly-acquired, wild tracts in Northern Asia, and to important outlets for the commerce of the empire, its members have not been less actively employed in enriching their country with valuable data, in cartography, ethnology, and statistics.

When I travelled in Russia, upwards of twenty years ago, the greatest of all desiderata, and which, as a geological explorer, I felt most, was the want of a good general map of the country. That work, which was commenced by the Imperial Geographical Society in 1857, has been completed, and the map was issued for sale last year. This most important work, embracing the Caucasus, has been followed by another still more scientific,—a Geographical and Statistical Dictionary of the Empire, of which some parts have already been published. Thanks to the very numerous journeys and surveys which have been made, this Dictionary will be a striking record of the substantial advances which Russia has achieved in the last quarter of a century.

In an Address like this, in which it is my duty to refer to geographical progress in many countries, I cannot do justice to the Imperial Society as regards numerous other subjects which this body has, in the most exemplary manner, combined with the extension of the higher branches of physical science. Inquiries of real utility to the nation, such as in times gone by were executed in England by the Society for the Diffusion of Useful Knowledge, have been made in various branches of statistics, showing how zealously the Russian Government is labouring to dispel ignorance, and thus, by extending true knowledge, to enable all classes the better to appreciate and value the vast improvement,

amounting to a social and peaceful revolution in the condition of the people, which the present Emperor has so liberally and beneficially introduced. Some of these good measures were, indeed, on the point of being carried out in the western Governments bordering on the kingdom of Poland, when the outburst of the insurrection in the latter seriously interfered with the development of the material prosperity and improvement of the country.

In reference to the establishment of telegraphic communication with China across Siberia, in which, as I announced to you last year, our associate Mr. Grant was busily employed, it is satisfactory to know that the Russian portion of the enterprise is so far completed, that the telegraph station at Irkutsk, distant 5700 miles from St. Petersburg, was opened five months ago (2nd December, 1863), and thus messages will be, as it were, instantaneously conveyed, which formerly required 23 days. To no country, indeed, is telegraphic communication of more vital consequence than to Russia, in which a Government messenger, carrying the most important despatch, would have occupied a month in conveying that which is now the affair of hours, if not of minutes.*

Further results of the expedition of Eastern Siberia and the borders of China, including all the river-system of the Amur, have recently appeared in the publication of a large map in 7 sheets, on the scale of 40 versts to an inch. This work, executed by M. Schwartz, is accompanied by a general detailed *aperçu*. The same author has also prepared a cheaper map on a smaller scale and embracing a much larger region of Siberia. M. Schebunin has executed a detailed map, on the scale of 5 versts to an inch, of Sakhalin, which shows great changes in the form which has been given to this large island in all preceding maps; he also contemplates de-

* In the lately-acquired territory of Eastern Siberia a new colony has been founded, to the south of the Amur, on the Usuri River which waters the richest country of that region.

The general reader as well as the geographer will be highly gratified by a perusal of the work of Le Comte Henri Russell-Killough, entitled '*Seize mille Lieues à travers l'Asie et l'Océanie*' (Paris, Librairie Hachette, 1864), which the author has transmitted to me since the Anniversary. The author's journey across Siberia and the Desert of Gobi, in the depth of winter, is in fine contrast to his descent in the summer of the great river Amur to its mouth, amid the most luxuriant and magnificent vegetation. I cite this work, when speaking of the geographical researches of the Russians, as giving so attractive a description of the scenery as to render many a traveller anxious to visit that magnificent gigantic stream, the Amur, during those months when it is open to navigation. In short, whether as respects Eastern Siberia, China, Japan, our Australian Colonies, or our Indian Empire, I gladly commend the work of Comte Henri Russell as a graphic sketch by a quick observer and a lively and agreeable writer.

tailed maps of other tracts, including the course of the rivers Amgun and Bureia.

From the researches of M. Schmidt the geologist, aided by the botanist Glehn and the topographer Schebunin, we learn that the region beyond the Sea of Baikal is distinguished by a great variety of geological formations. Crystalline rocks, however, abound, and the unaltered sedimentary fossiliferous formations are much less extended. Among the latter, the Devonian and Jurassic deposits have been best recognised. The latter has the petrographical characters of the Jurassic rocks of the Caucasus, and contains certain beds of coal, which in one spot is said to pass into graphite. Further eastward, and along the Saigon or chief mountains, and on the Amur below the junction of the Zeia, there are spread out great fresh-water formations of tertiary age, whilst in the great island of Sakhalin very recent marine tertiaries repose on true chalk and cretaceous deposits. Having discovered what he believes to be many transitions between crystalline rocks and unaltered sediments with fossils, M. Schmidt is of opinion that all such changes have been brought about in an aqueous manner, and not by any plutonic or igneous action. The ingenious author is obliged, however, to admit the existence of obsidian in one place, and has not yet developed his proofs in favour of his novel system, in which, if I have not been misinformed, he seems to carry the chemical and Neptunic ideas of Bischoff to what I cannot but consider an extravagant length.

From such theoretic speculations it is indeed comforting to myself, as a practical geologist, to turn to the more recent labours of my distinguished friend M. Abich in the peninsula Apcheron and the adjacent parts of the Caspian Sea. There, the apparition of new islands in the sea, and the eruption of the mud volcanoes on land, show, according to him, the close connection which exists, in a natural history point of view, between the ancient igneous phenomena so apparent throughout the Caucasus and the analogous but much more puny eruptions of the present day, as exhibited in the north-eastern flank of that great chain, where one of the islands (Kouman) was thrown up in 1861.

After five years of active labour and assiduous researches in Eastern Siberia and in regions rarely visited before, and some where no naturalist had preceded him, M. Radde has, as it were, completed our acquaintance with the zoology of these vast regions, parts of which only had been visited by Pallas, Middendorff, and Voznesensky, and recently by Maack and Schrenk. The last of these tra-

vellers gave indeed an excellent idea of the natural history of the region of the Amur; but M. Radde has done more, in gathering together a complete fauna of Eastern Siberia. He has prepared zoo-geographical maps of all the regions he traversed, in which he has shown, by means of colours, the limits of the range of each group of animals. His comprehensive geographical researches, which led him to divide Northern Asia into three zoological and botanical zones, are of a high order of merit. These regions are Siberia proper, to the southern limit of which the reindeer ranges, and in which the Siberian cedar grows; the region of the Mongolian Steppe; and the region of Northern Manchuria.

Confirmed as these grand zoological deductions are by the determination of the collateral plants of each, I am led to believe that, since the earlier days of Humboldt, there is no work on natural history which has more tended to complete the general views of the true physical geographer. This grand publication of M. Radde has directly resulted from the direction of the Imperial Geographical Society and the support of the Government; and we hope soon to be able to admire the illustrations of numerous natural types hitherto wholly unknown to men of science.

Another contribution to the physical knowledge of these countries is a pamphlet on the climate, by my valued friend M. Middendorff, the justly-celebrated traveller in Northern Siberia. The work entitled '*La Contrée de l'Amour*,' by M. Maximowicz, is also a most important addition to the literature of the Geography and Natural History of Siberia.

Irrespective of natural history as a branch of geography, one phenomenon has been brought out in strong relief by the physical section of the expedition to Eastern Siberia, viz., that in the basin of the Amur, as in the island of Sakhalin, the right bank of the river is steep and precipitous, and the left bank low and flat. I pointed out the same phenomenon twenty years ago in regard to the great rivers Volga, Oka, &c., in European Russia.* The probable explanation of this striking phenomenon is that the flat regions on the left bank of each river were formerly broad riverine sheets, and by the elevation of land, the destruction of forests, and other causes, have been so desiccated that the waters have at length found their natural boundary in the escarpment of rocks which rise successively from the low regions of the north to the loftier ranges of the south.

* See '*Russia in Europe and the Ural Mountains*,' vol. i. pp. 21, 650.

An expedition under M. Anosoff in search of a gold region on the Chinese frontier, reported as such by fugitives, has returned without success. They found that this tract had been extensively washed for gold, and, from the remains of buildings, &c., it is supposed this district of country had been occupied by a powerful people, but the gold seems to have been nearly exhausted.

In further developing the geography of the Kirghis countries between the Russian and Chinese boundaries, the Imperial Geographical Society have been so fortunate as to secure the services of M. O. Struve, who, assisted by M. Potamine, an accomplished Cossack, has been for some time exploring the water system of the Black Irtysh, and who, when last heard of, had passed the mountains, containing graphite, which separate the basins of Baikal and Tszai-San. The great lake of Tszai-San with its fisheries had already been occupied by Russia; it receives no streams from the north; the basin of the Black Irtysh is entirely distinct from that of the Ulangur. The explorers found the mountains of the South Altai to be much nearer to the Lake Marka than is represented on maps; this highly picturesque sheet of water being embosomed in lofty mountains. In these Asiatic explorations the Transilian, or country of the seven rivers (Semi-vetchurt), must not be forgotten as having been examined by Colonel Golubeff and Colonel Babkoff at the east end of the Lake of Tszai-San.

Coal has been found in the mountains of Karatau by Colonel Toherniaieff, which, though of poor quality, may prove of importance to Russia in feeding her new flotilla on the Sea of Aral, with fuel by transit along the great river Syr Darie. The present supply of coal for the Aral region comes from the coal-field of the Donetz in South Russia, a distance of about 1200 miles over the Caspian Sea and Desert of Ust Urt.

Among the important expeditions recently undertaken and directed by the Imperial Geographical Society is that which, under the guidance of the eminent naturalist M. Baer, aided by M. Radde, has examined the Sea of Azof. All the results of this inquiry are not yet fully known; but whilst we ascertain that the amount of sediment and detritus poured out by the Don and other streams into this inland sea necessarily diminishes the depth of its waters, yet, this operation not being so rapid as some persons have supposed, a long period will elapse before navigation will be materially impeded.

The conclusion of the Russian report had not reached me when this Address was read; but in the part transmitted I am glad to find that the eulogies which I passed, at the last Anniversary, on the labours of M. Khanykoff and the Russian Expedition in Persia quite accord with the well-digested analysis of M. Besobrasoff.

Arabia.—We have been much gratified within the last few months by the lively and exciting narrative of his journey across Arabia, given to us by Mr. Gifford Palgrave. This enterprising traveller, who took high honours at Oxford, and has since been a wanderer over many regions of Asia, travelled in the character of a physician across the northern and central parts of this great, but little known, peninsula; and, with the exception of Major Sadleir, who is described as having travelled with the silence of a bale of goods *in transitu*, he is the only one of modern explorers, who, crossing the very heart of the country, emerged on the Persian Gulf.

Although Mr. Palgrave has fixed no latitudes nor longitudes, he yet travelled far beyond the adventurous Wallin of Finland, who only reached Hall. His sketch of the people of the inland kingdom of the Wahabites, and their capital Riadh, and the clear distinction he draws between the wandering Bedouins and the regularly governed, civilised, and strict Wahabite Mahomedans who live in the central towns, are so very instructive, that the Council have warmly approved his labours by conferring on him a testimonial. I trust that Mr. Palgrave will elaborate the eloquent communication he made to us, and which is given *verbatim* in Vol. viii. p. 67, of our Proceedings, by producing a work worthy of his abilities and research. I can truly say that on no occasion have I seen the Fellows of the Geographical Society more gratified and excited, than when Mr. Palgrave narrated his adventures in crossing Arabia; and surely, as respected the deep interest created, I was fully borne out when I termed his narrative the Thousand and Second Arabian Night's Tale!

Little as we know of the interior of Southern Arabia, I am reminded by my friend the Rev. C. Forster, that there are evidences tending to sustain the accuracy of Ptolemy, when he speaks of four rivers in that region. In the parts of Arabia traversed by Mr. Palgrave, a river, after fertilising whole valleys, disappears under the sands, and re-appears no more. So is it in the south. For, even on that very coast, so well surveyed by the ship *Palinurus*, and where no rivers were discovered, a river, the mouth of which is lost under sands, was discovered by the late Rev. Thomas Brookman, who

examined that coast in an Arab *dhow*, proceeding from Aden to Shehr, and landing continually in spots where no large ship (like the *Palinurus*) could approach. This river is considered by Mr. Forster to be the *Caña Canim* of Ptolemy; and a lithographic sketch of it is given in his '*Sinai Photographed*,' and is described at pp. 349, 352 of that work. Mr. Forster further believes, from the accounts given to Mr. Broockman, that another of Ptolemy's four rivers, the *Prion*, runs parallel to the coast-ridge, and is lost in interior sands. Not pretending to give any opinion upon the question of whether these rivers be really two of those mentioned by Ptolemy, it is gratifying to find that, as in Africa, so in Arabia, modern discoveries go to sustain the accuracy of that great ancient geographer.

Hindustan.—The Report of the operations of the Trigonometrical Survey of India during 1862-63, is full of interesting professional details. This great Survey, which was commenced upwards of fifty years ago, and which has since been so ably conducted by our distinguished Associates, Sir George Everest and Sir Andrew Waugh, is one of the most important results of our rule in India; and the present Report by Major J. T. Walker, R.E., as one of a series containing the history of the Survey, is of great value. In addition to the general review of the proceedings for the year, it contains two Reports, which are complete in themselves and of special interest, namely, an account by Mr. C. Lane of a portion of Independent Tipperah, and a reconnaissance, by Captain J. P. Basevi, R.E., F.R.G.S., of a portion of Jyepore, in Gondwana. These are parts of India hitherto unknown, and which have never before been visited or mapped.

The important observations of Captain Godwin-Austen on the region of the Western Himalayas will be commented on under the head of *Glaciers* (p. 221).

Major Showers, of the Indian Army, has recently published some interesting letters upon two practical questions connected with the geography of India: the one refers to the terminus of the Madras Railway on the Malabar coast—the other to the proposed port at Sedashegur. Major Showers gives good reason for preferring Narakal—6 miles north of Corhin, as the ocean terminus of the railway—to Beypoor, which is 80 miles farther to the northward, the latter being an open roadstead exposed to the full force of the south-west monsoon; whilst at the former place, the sea within the area of a square league, forming the anchorage, is in all weathers perfectly calm. If the account which Major Showers gives of this locality be correct—and he appears to write

from personal observation as well as on the authority of the resident Marine Officers—the calmness of the sea along the Narakal shore is one of the most remarkable phenomena of physical geography in the world, and well merits further investigation. With respect to Sedashegur, which is regarded with so much interest at present, as the proposed outlet for all the cotton-produce of the Southern Mah-rattan country, Major Showers's opinion is decidedly unfavourable. He shows, in the first place, that the construction of a breakwater in the open sea, without which the port would be inaccessible during the monsoons, would be attended with the utmost difficulty, owing, on the one hand, to a sea-bottom of soft yielding mud, and, on the other, to the working season being limited to an interval of seven or eight months' duration; and he shows, in the second place, that if the port were formed, it would be almost impossible to maintain a regular communication with the interior, owing to the natural obstacles—especially from floods—as well as the extreme unhealthiness of the surrounding tract of country.

Formosa.—Mr. Swinhoe, who had well prepared himself for such a task by a long residence in China, has given us a very clear account of the geography, ethnology, and natural history of this island. The value of this communication from H.M. Vice-Consul at Formosa was pointed out at length to the Society by Admiral Collinson, who formerly surveyed its shores, and by Sir Harry Parkes, who gave to the meeting an instructive sketch of the history of European, Chinese, and Japanese relations with the islanders. The prospects of increased trade with this large and fertile island, now that it is opened under Lord Elgin's treaty to Europeans, were discussed, and the statements of Mr. Swinhoe confirmed regarding the superiority, as ports, of Tam-Suy and Ta-Kow to the port Taiwan, which was the one originally selected.*

The Malay Archipelago.—At the meeting of the 8th June, 1863, we were gratified by the reading of a Memoir from the pen of that eminent naturalist, Mr. A. R. Wallace, on the Malayan or Indo-Australian Archipelago.† After eight years, passed in that highly-interesting region of islands of all dimensions, from the vast and still little known Borneo, and the still less known New Guinea, to the remote and semi-barbarous Timor, Mr. Wallace came before us with a well-established natural boundary-line between one large

* See 'Proceedings Royal Geog. Soc.,' vol. viii. p. 23; also 'Proceedings of British Association for Advancement of Science,' Newcastle Meeting, 1863.

† See Proc., vol. vii. p. 206.

region of the islands of the Archipelago and another; the one being Asiatic by its animal and vegetable life, the other having an Austro-Malayan type.

Indicating how the Asiatic Islands were probably once connected as *terra firma*, and pointing to the various oscillations of the surface, in these lands so replete with volcanoes, Mr. Wallace happily shows how, by simply traversing one gut or channel occupied by a deep sea, only 15 miles wide (between Bali and Lombok), the traveller is at once transported from the Asiatic to the Australian kingdom of natural history. This physical separation he considers to be one of great antiquity, whilst the separation of the mass of Asiatic lands to the west of it into innumerable smaller parts (yet all being a community of Asiatic type), is viewed as being of posterior date.

Whilst this philosophic Memoir naturally gave great satisfaction to my learned and sagacious friend, Mr. John Crawford,* who has passed many years in the Indian Archipelago, I must also be allowed to say that it gave equal satisfaction to myself, from the skilful manner in which the author brought to bear all his lore in the various branches of natural history, to sustain his grand geological inductions as to the enormous changes which have successively occurred in the physical geography of those diversified regions.

It is, indeed, to be remembered with pride (particularly by us, who cheered on Mr. Wallace when he left these shores ten years ago on his adventurous travels), that no such results as these could have been laid before geographers when the sciences of Zoology, Botany, and Geology were in their infancy. The work of Mr. Wallace is, therefore, a true index of the advance which has been made in geography, in the correlation of the most arduous and extensive researches and observations of the traveller and statist with every branch of natural history science.

Australasia.—The great and important discoveries made in hitherto unexplored tracts of Australia having been largely dwelt upon in last year's Address, I will confine myself now to mentioning several collateral subjects, which have recently been brought forward in respect to that vast portion of the terrestrial surface of the globe.

The intention, to which I alluded at the last Anniversary, of colonising portions of North Australia by South Australian settlers, to proceed thither by sea, is about to be carried into effect. A North

* See Mr. Crawford's most valuable work, 'A Descriptive Dictionary of the Indian Islands and adjacent Countries' (Bradbury and Evans, 1856), with a map of the Asiatic Archipelago.

Australian Settlement Company has, indeed, been formed, the chairman of which is Sir Richard Graves M'Donnell, the late Governor of South Australia, and under whose administration M'Douall Stuart* made that remarkable journey from Adelaide to the Indian Ocean,* which has led his brother colonists to make this great venture. If success should attend the bold enterprise, whether brought about by a settlement in Van Diemen's Gulf, or in the Queen's Channel of Cambridge Gulf—the latter of which I should think much preferable (see my last Address)—then it is almost certain that a separate North Australian Colony must be established, inasmuch as it will be impossible that the Government of Adelaide should rule a population separated from them by a distance of 1300 miles, much of the intervening space consisting of tracts of almost impassable sands and forests.

If such a colony should be established, and it be afterwards found impracticable for Englishmen to labour in the open air in so warm a latitude, I trust that Hindoos, Malays, or Chinese may be used for that purpose; for, by whatever means effected, I shall rejoice in seeing the realisation of a project, which I have advocated at meetings of this Society for many years. I am fully persuaded that, with the rich products of that region, the fine bays of the sea on the south shore of the great Indian Ocean must, sooner or later, be occupied by a great maritime nation like our own, which already possesses the other three sides of this vast continent.

Already, indeed, we know that, under the auspices of the Governor of Queensland, Sir George Bowen, and for the purposes of trade and commerce, a new settlement has been made at Cape York, the northernmost point of this continent. From the same authority we learn the results of the important naval survey of the inside of the Great Barrier Reef, as completed by Commander Robinson. On this point I must refer you to the full explanatory comments of Sir Charles Nicholson and the Hydrographer, Captain Richards, as given in the report of the meeting on the 11th April last, which is to be seen in our Proceedings.

We now know, from the high authority of Captain Richards himself, that, although twenty years ago the inner route from Cape York to Moreton Bay was the most intricate passage in the world, it is

* Whilst these sheets are passing through the press I have received copies of the 'Journals of J. M'Douall Stuart,' which have just been published in a handsome volume, by Messrs. Saunders and Otley; edited by Mr. Hardman, and illustrated by Mr. Angas, with an excellent map by Weller. The work ought to be in the hands of all who are interested in Australian exploration.

now rendered as navigable as the English Channel, thanks to the labours of our naval surveyors. It was, indeed, most gratifying to find Captain Richards characterising that survey as one of the most gigantic and splendid undertakings ever carried out by any nation; and I repeat, what I have said before, that every true geographer will gratefully cherish the recollection of those bold and skilful seamen, Captain F. Price Blackwood, Captain Owen Stanley, and their successors, through whom the east coast of Australia has been opened out to the navigation of the world.

The mooted question of the extent to which the successful propagation of flocks of sheep can be carried in advancing towards the Equator from our old settlements in Australia, which was vigorously discussed last year, particularly when the journeys of Landsborough and McKinlay were under our notice, has been revived, and will no doubt continue under discussion until the perseverance of our countrymen shall have decidedly settled that limit by experience. As far as ascertained data go, it had been found that in Australia sheep have thriven up to 19° south latitude, which alone gives us an enormous range for the flocks of new settlers.

Amid the few regions of which we have acquired little or no additional knowledge in the last quarter of a century, we may certainly place New Guinea. Hence it gave me much pleasure when the attention of the Council was directed to a proposal of Sir Charles Nicholson to endeavour to explore the southern coasts, bays, and rivers of that great mass of land, from the new settlement of Cape York. I trust that the Admiralty (looking only to the narrow channel which separates New Guinea from Cape York) will lend a helping hand in such a survey, as soon as circumstances will permit.

New Zealand.—From Australia and tracts lying to the north of it, let us turn to the southern portion of Australasia, New Zealand; where, despite the war which has unfortunately prevailed in the northern island of the group, great advances have been made in delineating the physical geography and geological structure of the provinces of Canterbury and Otago, in the middle island.

Three Papers of great interest have been communicated to the Society, which throw additional light upon the physical geography of the hitherto unsurveyed districts of the great middle island of New Zealand, and contain new facts illustrative of glacial action. I consider it, indeed, to be a fortunate circumstance for our science, that these regions should have been

visited by such men as Dr. Hector, Mr. M'Kerrow, and Dr. Haast. We may now compare their observations with those of Professor James Forbes and others in the Alpine regions, and those of Dr. Thomson and Dr. Hooker in the Himalaya Mountains, of which I shall have occasion to speak at some length in explanation of my own views as a geologist upon this interesting topic of glacial action.

The first of these papers to which I call your attention is that which relates to the successful journey across the province of Otago, by my friend Dr. Hector, so distinguished already by his explorations in North America and British Columbia. Leaving the town of Oamaru, his party proceeded by the right bank of the Waitaki River, and then, following the course of the tributary Ahuriri, crossed Robinson's Saddle. At the Wanaka Lake the party left the outposts of the settlers, and proceeded into the *terra incognita* by way of the Matukituki River, which empties itself into the lake upon its western shore. Forming a central camp here, Dr. Hector with two men proceeded up the valley, and after exploring in a northerly direction, without success, for an available route, advanced on foot, and reached the glaciers which form the source of the river. Ascending a saddle-shaped mountain by a steep climb, partly over the glacier, they found its elevation to be 5500 feet above the sea. The view obtained of the mountains was extensive and grand; Mount Aspiring, enveloped in ice, 10,000 feet high, on the right; and Mount Richards, with its enormous glacier which forms the source of the Jackson, on the left. It was here that the track of gigantic birds, supposed to be the *Dinornis*, which was first taken for a native pathway, was observed. After a vain endeavour to follow the course of the Jackson River to the sea, owing to the density of the woods, they were compelled to return, having reached a point 8 miles from the west coast.

Another Paper on New Zealand is a Reconnaissance Survey of the Lake districts of the Otago province, by Mr. M'Kerrow, who states that 4883 square miles have been surveyed and classified into Pasture, Forest, Lake, Barren, and Swamp. The bearings of the survey from the true meridian and a datum line for altitudes are given. In his remarks upon the configuration of the country, Mr. M'Kerrow calls attention to the great and sudden differences of elevation that diversify its surface. The mountains rise from 4000 to 9000 feet, and the line of perpetual congelation in that latitude has been determined to be 8000 feet. The mountain-ridges lying

in a N.N.E. and S.S.W. direction, are directly athwart the track of the prevailing wind from the Pacific Ocean; and it was noticed that the snow-line on the north-west side (the side exposed to the wind) of the mountain-ridges was higher than upon the south-east or the sheltered side; thus showing that the wind has a very decided influence in producing this effect. The flood-marks show a rise and fall of water almost incredible, and the deltas at the mouths of the rivers are invariably and rapidly advancing into the lakes. The value of the latter as reservoirs, restraining the floods, is particularly expatiated upon, and the greater extent of the lakes at a former period is pointed out; while attention is called to the varied influences at work which produce a condition of "unstable equilibrium" in the atmosphere, producing storms of great violence.

The third Paper is a most important account of the highly interesting journeys of the provincial geologist, Dr. Haast, of whose deeds I was led to augur most favourably, in consequence of the high character which he brought with him from Vienna, as testified to me in a letter from my eminent friend, M. von Haidinger. In the year 1861, the rivers Ashburton and Rangitata were traced by Dr. Haast to their sources in Mounts Arrowsmith and Tyndall. In 1862, the course of the River Tengawai was followed, and the mountain-range crossed to Lake Tekapo, the affluents of which were traced to the Godley Glacier and Mount Darwin. Lake Pukaki was visited, and its sources in the declivities of Mount Cook ascertained; and the Naumann Range, from whence the Dobson and Hawkins take their rise and flow into Lake Ohau, was explored.

In 1863, Dr. Haast proceeded from the Orihi River along the coast to the Waitaki River, which he ascended, and followed the course of its first tributary on the left bank (the Ahuriri) to its source, visiting also the western shore of the Ohau Lake. The Hawea Lake was crossed from south to north, and the River Hunter explored to its source in Mount Ward. Lastly, the Wanaka Lake was traversed; the River Makarora traced to its origin, from whence he crossed over a pass, 1012 feet above the sea, and descending a river (which has since very properly been called the Haast), he reached the western shore of the island near Open Bay.

As a general commentary upon these remarkable journeys, Dr. Haast observes, like Mr. McKerrow, that a longitudinal mountain-chain of great magnitude, forming the watershed of the island, runs from north-east to south-west. The continuity of this chain is broken through only in a very few places, otherwise it presents

high and abrupt walls of great altitude throughout its whole length in the Canterbury province, wherein it reaches an estimated height of 10,000 feet. Dr. Haast describes the different passes through this chain, and in particular that pass which he considers to be unique in physical geography, and through which he penetrated to the western shore of the island, over a ridge not more than 1012 feet high.

In the course of these explorations he has availed himself of the opportunity of remarking and commenting upon the features of glacial action, which he has thoroughly described in all its different phases, and illustrated by a series of very beautiful, coloured sketches upon a large scale. The sketches are now deposited in the archives of our Society, and, together with the admirable description which accompanies them, will enable the physical geographer to compare the results of Dr. Haast's observations with those which have been made amid the glaciers of the Alps and of the Himalaya Mountains.

In one of his interesting communications, Dr. Haast describes the zealous efforts made by Mr. Whitcombe, after traversing these Alps, to reach the mouth of the Taramakau River; and I must refer you to our 'Proceedings,' vol. viii. No. 3, p. 58, for a very touching account of the manner in which that excellent scientific observer lost his life.*

It appears that Mr. Albert Walker, with his brother and Mr. McFarlane, passed through a country on the west coast which had hitherto proved inaccessible, *i. e.* from the mouth of the Taramakau river to that of the Wanganui. Mr. Walker sent his account of this arduous journey to our late Assistant-Secretary, Mr. Greenfield; but through the confusion incident to the illness and death of that gentleman, this document has not yet been read or noticed.

As your attention was directed at the last Anniversary to the rapidly increasing produce of gold in the western parts of the province of Otago, it is unnecessary that I should recur to that important feature in the structure of New Zealand.

AMERICA.

British Columbia and Vancouver Island.—Though unable to comprise within the limits of a short memoir any detailed description of British Columbia, Lieutenant Palmer, R.E., who has served in that

* I earnestly hope that chromo-lithographic copies of those very remarkable coloured sketches of the New Zealand Glaciers will be soon published. Glacialists and Alpine travellers should possess them.

colony four years and a half, has given us a very clear and sensible sketch of the geography and chief capabilities of that vast, and, as yet, very imperfectly explored region. Subtended on the west by the densely-wooded coast or Cascade range, with its long and deep bays, and on the east by the flanks of the much loftier Rocky Mountains, a band of plateau-like and undulating country, of about 100 miles in breadth, watered by the Fraser and its tributary streams, is the tract which may eventually be best rendered capable of yielding produce for the support of the mining population. The chief gold mines, which lie in the mountainous tract of Cariboo, to the east of the plateau land watered by the Fraser, are well described, and we learn how the earlier proprietors traced up the precious metal, from the banks of the Fraser and Thompson Rivers, till they reached those western watersheds of the Rocky Mountains, in which, doubtless, vast amounts of mineral wealth lie hidden. The picture of the difficulties which the miners have to encounter is thoroughly well drawn, whether as to the want of provisions, or the excessive cold, and all the disadvantages of a new settlement in a wild and sterile land. In fact, gold mining is only beginning in British Columbia, and the few creeks in which diggings have been so successful will be followed up by discoveries of gold in the quartz veins of the slaty rocks. In British Columbia, as in California and Australia, those quartz reefs, be they veins or altered beds, range from north to south, or rather from north and east to south and east. Now, when we correlate this fact with similar data, as obtained from the auriferous regions of Australia and Russia, in all of which, as well as throughout the great chain of the Andes, the same prevailing north and south strike of the quartz bands is dominant, science has still to search for an explanation of this most striking physical phenomenon, to which I have directed attention in several publications upon the distribution of gold.*

The memoir of Lieutenant Palmer is concluded in the following words, which are, I think, entirely borne out by the facts he has adduced:—"From its geographical position, its mineral wealth, the great salubrity of its climate, and its valuable natural products, British Columbia, with good management and by a process

* See 'Russia and the Ural Mountains,' vol. i. p. 472 *et seq.*; 'Siberia,' 2nd edit. pp. 479 *et seq.*; Addresses to the British Association, Royal Institution Royal Geographical Society, *passim*; and several other works, from 1846 to 1850, including the article in the 'Quarterly Review' of 1850, entitled 'Siberia and California.'

of gradual development, is likely to take rank as not the least important of the Colonies of the Crown."

This opinion has been ably sustained by Colonel Moody, under whom Lieutenant Palmer served, and who, from having been a Crown Commissioner for some time, is a most competent and reliable authority.*

Thanks to the admirable Nautical Surveys, chiefly conducted by that able hydrographer, Captain Richards, who now directs the construction of all the charts of the Admiralty, the singularly diversified coasts of the noble island of Vancouver have been accurately delineated. Fortunately for our science, Captain Richards had a medical officer on board his ship, Dr. C. Forbes, R.N., who has brought out, in a most efficient manner, all the data relating to its resources and capabilities as a colony. In introducing his subject, the author well says, that "the romance and mystery which hang over the scenes first visited by Cook and Vancouver, have now given way to a hopeful reality, and the emigrant sees before him a land full of promise and of hope."

After an excellent descriptive sketch of the whole region, Dr. Forbes dilates on its physical geography, geology, hydrography, and meteorology, and then treats of the political geography and statistics of the rising colony; so that I can safely refer any one who wishes to obtain a true acquaintance with this great flanking buttress of British Columbia—this key to the influence which a British fleet must ever exercise in the Pacific—to the valuable Memoir of Dr. Forbes, which will soon be printed in our volume, and also to a valuable Prize Essay by him, published by the Colonial Government. The author expresses his sense of the impossibility of doing justice to all the resources and capabilities of Vancouver Island: but in pointing to it as a commercial emporium between two great wealth-producing countries, to the certain rewards attending steady industry, the prospect of good settlements, and the excellent system of education established for the youthful part of the colony, all these, he justly says, are "sound attractions, to draw thither the capitalist, merchant, working farmer, miner, and skilled mechanic, and even the honest labourer."†

South America.—In South America, steam navigation and railroads are fast adding to our knowledge of rivers and lands hitherto very imperfectly described.

* See 'Proceedings,' vol. viii. No. 3, p. 91. † See 'Proceedings,' vol. viii. No. 3.

The Survey across the Upper Provinces of the Argentine Republic, for Mr. Wheelwright's gigantic scheme of a railroad over the Andes to unite the shores of the Pacific with those of the Rio de la Plata, has led to the collection of fresh information regarding those provinces. Mr. Hutchinson, H.M. Consul at Rosario, on the Parana, from whence the railroad is to run to Cordova, has lately made a journey through them, of which he has transmitted the details to this Society through the Foreign Office, with an excellent map by Dr. Burmeister (now Director of the Museum of Natural History at Buenos Ayres), containing corrections made by himself and by Mr. Coghlan, one of our Fellows who is engaged in engineering works of considerable importance for improving the navigation of the great river Salado, which runs through them—information which will be very useful to geographers. (See Stanford's New Map of South America.)

With reference to Mr. Wheelwright's project, recent advices from Chile allude to the Survey of a Pass by the Planchon over the Andes, in about lat. 35°, to the south of the province of Mendoza, communicating with Curico in Chile, through the valley of the river Teno—which seems to offer on many accounts a better line for the projected extension of his railroad from Cordova than that originally projected by La Rioja to Copiapo; the elevation of the Pass in question not exceeding 6000 feet instead of 16,500, the height to be surmounted according to the first plan described in Mr. Wheelwright's Paper in the 31st volume of our Journal, and which was reconsidered at the last meeting of the British Association.

This Pass, now called a new discovery, appears to be the same as that called De las Damas, or The Ladies' Pass, which was carefully examined sixty years ago by a Spanish officer, Zamudio, who reported to the Viceroy of Buenos Ayres that it might be made practicable for wheel carriages at a very small expense. His account of it is given in De Angelis' Collection of Records of the Rio de la Plata, a copy of which is in our Library.

One of the most interesting Papers read this year to the Society is the narrative, translated from the Spanish, and communicated by Sir Woodbine Parish, of Don Guillermo Cox's journey by a Pass over the Andes to the south of Valdivia, not 3000 feet high, to the great lake of Nahuel-Huapi, on the eastern side of the Cordillera, and of his descent for the first time of the river Limay, which falls into the Negro, and which, from its junction with the Limay, was ascertained to be navigable throughout its whole course across Patagonia to the Atlantic, eighty years ago by Don Basilio Villarino, whose

Diary, also communicated to us by Sir Woodbine Parish, is given in the 5th volume of our Journal.

Señor Cox, though prevented by an accident to his boat from completing his object of passing down the Negro to the Buenos Ayrean settlement of Carmen at its mouth, has had the satisfaction of uniting his work with Villarino's Survey, and of proving that from the lake of Nahuel-Huapi, on the eastern side of the Andes, there is a continuous water-communication to the Atlantic, the future importance of which it is difficult to estimate.

The observations which, on the reading of this memoir, fell from our medallist Admiral FitzRoy, who so distinguished himself in the survey of all the coasts of the southern extremity of America, including a visit to a portion of the region explored by Señor Cox, will be read with deep interest.*

Sir Woodbine Parish, who perhaps has studied the geography of that part of South America more than any other living individual, and who spoke so effectively on the same occasion, is of opinion that Señor Cox's exploration, made under great difficulties and entirely at his own cost, deserves the highest commendation. A detailed account of his travels and adventures amongst the Indians who inhabit the eastern sides of the Andes has been published in Chile, in a volume replete with information regarding the habits and customs of those tribes, as well as on the topography, botany, and geology of that part of the Andes. A copy of the work has been transmitted to me, and it is to be hoped that some one will undertake to publish a translation of it, for the benefit and instruction of all who are interested in the present and future of those countries.

I may add, in relation to this portion of the continent, that, in the Bulletin of the French Geographical Society for March and April, 1864, there is a memoir by Mons. B. Peucelet on the province of Catamarca, one of the remotest and least known of the districts of the Argentine Republic. The memoir contains much information on the climate, productions,† and trade of the country, as well as many corrections of errors existing on all the maps of the region published

* See 'Proceedings,' Royal Geog. Soc., May 9th, 1864.

† Some interesting facts relative to the climate, pasturage, and productions of the Falkland Islands are given by Admiral Sullivan in a letter to the 'Times,' dated Dec. 31, 1863. He resided there during three winters and two summers, and made large experiments on the capabilities of the colony for grazing purposes, having had 1400 head of wild cattle tamed, and leased 40,000 acres of land. Speaking highly of the climate and pasturage, he strongly recommends that the eastern island be made a penal settlement.

in Europe. Mons. Poucel has spent thirty years of his life in these countries.

We are indebted to Mr. Hinchliff, one of the Fellows of this Society, and well known as an adventurous member of the Alpine Club, for a very graphic account of a tour made by him last year in Southern Brazil and the Eastern Provinces of the Rio de la Plata, under the title of '*South American Sketches*,' in which his vivid descriptions of the excitement of life amongst the Gauchos are such as, I doubt not, will lead other equally enterprising spirits to follow his good example, and bring us fresh stores of information from those new countries, especially when they learn from Mr. Hinchliff's book how easily they may be reached; "for," as he says, "the limits of a barrister's long vacation are sufficient to allow of his passing five weeks in the cool season amidst the glorious vegetation and unrivalled scenery of Brazil."

The peopling of the fertile plains of the River Plata is now progressing with great rapidity; and as exact information on the nature of the new population which is pouring into these southern parts of America is not easy to procure, a memoir,* recently sent to this Society by our Corresponding Member, Signor Cristoforo Negri, is worthy of mention, as supplying data showing the large Italian element that these growing new countries will contain. The result of Signor Negri's inquiries is that, at least, 8000 Italians annually leave the ports of Italy for this region; and that 100,000 emigrants have departed within the last 25 years, the number still increasing from year to year. This drain is from the most industrious classes of the population, and the advantages to the Spanish republics are correspondingly great; for, according to Signor Negri, all but an insignificant fraction naturalize themselves in their new home.

While on the subject of South America, I have pleasure in announcing that the indefatigable explorer, Mr. Richard Spruce, who has for fifteen years been unceasingly employed in scientific labours in the valley of the river Amazons, and in the Andes of Ecuador, is on his way to England. Of his great services to botany it is not for me to speak, but his geographical work is fully entitled to special notice at my hands. Mr. Spruce left England in the year 1849, and landed at Pará, whence he proceeded up the river Amazons, and explored several of its least-known affluents. In 1849 he ascended and made a map of the river Trombetas, an

* See the '*Corriere Mercantile*,' Genoa, 29th September, 1863.

important tributary of the Amazons which was hitherto unsurveyed. In 1853 and 1854 he ascended the Rio Negro, Cassiquiari, and Orinoco, exploring and mapping the river Cunucunuma, a tributary of the Orinoco, and the river Pacimoni, which flows into the Cassiquiari. The maps of these three rivers were made by means of cross bearings and astronomical observations, and will form an important addition to geographical knowledge. During the years 1855 and 1856 Mr. Spruce ascended the river Huallaga, and in 1857 he successfully surmounted all the difficulties of the navigation of the rivers Pastaza and Bombonaza, and reached the Andes of Quito. He has since been engaged in exploring the southern part of the republic of Ecuador; and during 1860 he was employed by the Secretary of State for India, in co-operation with our Secretary, Mr. Clements Markham, in collecting *chinchona* plants and seeds in the forests at the foot of the mountain of Chimborazo.

After fifteen years of such incessant toil in the cause of science, exposed to innumerable dangers and privations, the health of Mr. Spruce has been much impaired; but I trust that the renovating air of his native land will restore it, and that geographers, as well as botanists, will be put in possession of the fruits of his valuable researches.

I conclude my notices of South American explorations, by observing that travellers or emigrants intending to proceed to Brazil, or to any part of the River Amazons, will find a very convenient hand-book for their guidance in a small volume published by Mr. Belmar, a French gentleman, entitled, '*Voyage aux Provinces Brésiliennes de l'Amazonie, en 1862; précédé d'un rapide coup d'œil sur le Littoral du Brésil.*'

GLACIERS.

Glaciers of the Himalaya Mountains and New Zealand compared with those of Europe.—On the Powers of Glaciers in modifying the Surface of the Earth, and on the Agency of Floating Icebergs.—In the last Anniversary Address* I directed your attention to the state of Greenland as it is, in order to impress upon the minds of our Fellows who have not attended to the connection between existing geography and the ancient conditions of the globe, that Scotland and large

* See 'Proceedings,' vol. vii., No. 4, and 'Journal,' vol. xxxiii.

portions of Northern Europe must, at a period anterior to the creation of man, have been in the same condition as that in which Greenland and its adjacent seas are now. In other words, that, in the glacial epoch of geologists, certain elevated tracts were permanently occupied by fields of snow, with glaciers descending from them to the bays and cliffs of the sea, and that the erratic blocks which we now find spread over central England and the plains of Germany are simply the relics of icebergs which floated over wide tracts then submerged, and which, on melting, dropped them on the then sea bottom.

In the last session the vivid descriptions of the glaciers of Western Tibet, by Captain Godwin Austen, and of the glaciers of the middle island of New Zealand, by Drs. Haast* and Hector,† have specially attracted the attention of the Society; and I am therefore led to dwell on these grand terrestrial phenomena by giving a general view of the results of glacial action, both terrestrial and subaqueous.

When the first of those Memoirs was read, Dr. Hugh Falconer, who had passed several years in that same region of the Tibetan Himalayas, enlarged upon the scenes which had been so graphically delineated on maps by Captain Godwin Austen. He then referred us to the works of those who preceded and followed him in examining that region, and reminded us of the names of Moorcroft, Trebeck, Jacquemont, Vigne, Strachey,‡ and Thomson.

In considering the subject of glaciers, I am bound specially to call

* Dr. Haast (as before-mentioned) has sent to our Society a series of coloured sketches of the Glaciers of the Western Coast of the Province of Canterbury, which for striking effect seem to me never to have been surpassed by any delineator of icy regions. The juxtaposition of these glaciers to a splendid forest vegetation, and amidst mountains which are close to the sea, and yet rise to 10,000 feet above it, the depth of the gorges, and the height of waterfalls issuing from the ice, are all very remarkable.

† By a letter just received from Dr. Hector, dated 20th January, 1864, I learn that not only has he ably explored the region occupied by glaciers in the province of Otago, but has also visited, in a steamer, the wonderful fiords on the western side of the island. He is now preparing a work on the geological structure of the colony, in which he will show that the lakes on the eastern slopes of the country are true rock basins, which were once occupied by glaciers, and the bottom of one of which sounded by him has a depth of 1250 feet, or considerably below the sea. Although Dr. Hector does not go so far as to express his belief that these rock-basins have been scooped out by ice, he suggests that they have been filled and shaped by glaciers. He avows, however, that he has to read up much on this subject, and I only regret that this portion of my Address cannot probably be in the hands of my distinguished friend before his final conclusions may be published.

‡ In 1847 Lieut. R. Strachey visited and described the glaciers of the Pindur and Kuphinee Rivers, and applied to them the excellent Alpine classification of Professor James Forbes.

your attention to the last-mentioned of these explorers, Dr. Thomson, who first well defined the characters and extent of the glaciers of Western Tibet. In addition to a masterly description* of the physical geography of the regions he traversed, the work of Dr. Thomson is also so rich in botanical, climatological, and geological researches as to be a model for geographical explorers. Thus, his original observations on the enormous lacustrine deposits, replete with the remains of fresh-water shells, accumulated formerly at vast heights above the sea, are to my mind the grandest and clearest proofs of how the feeders of the Indus in bygone periods were dammed up by rock barriers, which later acts of upheavement may have disrupted, or by gigantic transverse or terminal glaciers and their moraines. In truth, therefore, the parallel roads of Lochaber in our Highlands, to which I adverted last year, have their grander analogue in the vast horizontal terraces of the mountains of Tibet. Again, among the remarkable data set before us in that work, is the striking fact that in the trans-Sutlej region of the Himalayas, the glaciers which descend from the southern flank of a range of mountains are longer than those which occur on the northern flank of the same. This is accounted for by the author on the grounds of the great amount of moisture proceeding from the ocean being arrested and condensed into snow by the first great range of heights which it encounters. The same phenomenon was, indeed, met with in Sikhim by Dr. Joseph Hooker, in the eastern portion of this great chain. Unlike his precursors, Thomson, when he wrote, was already conversant with the true laws of glacier movements, as well as the most remarkable of their effects, as pointed out in various works by Agassiz and other writers upon the Alps, and he specially refers to Professor James Forbes; for, though many an ardent traveller had preceded him, Thomson was the first who clearly distinguished the glaciers of the Himalayan Mountains from the snows whence they issued, and who at the same time pointed out the lateral and terminal moraines which they evolved. That which Thomson did for the western or Tibetan portion of this lofty chain of mountains was, in like manner, admirably done by Dr. Joseph Hooker for the eastern mountains of Sikhim, in his most attractive work.†

All these observers, whether in India or in New Zealand, have taught us that the glacial phenomena, though on a much grander scale in the Himalayas, are precisely analogous to those in Europe.

* 'Travels in the Western Himalayas and Tibet.' 1852.

† See 'Himalayan Journals.' 1854.

The application, however, of accurate topographical surveying, and the ascertainment of the precise length and breadth of those grand rivers of ice, were wanting. Captain Godwin Austen has effected this, as regards those vast glaciers proceeding from the Mooztagh, which lie to the west of those descending from the Karakorum Pass, described by Thomson. Having measured the length and breadth of these masses, he has enabled us to know that one of them, which feeds the powerful affluent of the Indus called Shiggar, has a length of 36 miles, and is therefore upwards of three times the length of any existing glacier of the Alps; though it will presently be shown that some of the old Alpine glaciers were considerably longer. Well, indeed, may we account for these grandiose dimensions now existing in the Himalayas, when we recollect that the passes by which travellers proceed to Yarkand have a height of 18,000 feet, and that the great Karakorum Peak rises to 28,200 feet, above the sea. Captain Godwin Austen is, I understand, about to explore the great *terra incognita* which the Burhampooter is supposed to traverse in the upper part of its course, and we may confidently hope that, at no distant day, this energetic young officer will ultimately obtain the highest honours of this Society.

In the discussion which followed the reading of the memoir of Captain Godwin Austen, Dr. Falconer grappled most ably with the novel theory that the lakes of the Alps owe their origin to the erosive action of ice, which, descending from former great glaciers, has excavated or scooped out the cavities now filled with water. Being one of the few men who have personally examined the glaciers both of the Himalayas and the Alps, his reasoning from observed facts is most valuable. Believing, with the vast majority of practical geologists, that the irregularities of the surface of the Alps have been primarily caused by dislocations and denudations, he gave it as his opinion that the Alpine cavities, having been filled with ice during the glacial period, were thereby protected from the influx of the vast masses of the detritus hurled down in the moraines of gigantic glaciers that passed over these countries on solid ice, which, on melting, left the depressions in the condition of lakes. On the southern flank of the Himalayan mountains, on the contrary, where ice has not acted as a conservative agent, the valleys have been choked up with débris, but no great lakes exist. Dr. Falconer expressed the same views at an evening meeting of the Geological Society, on the 5th March, 1862, but it is not the practice of that body to record the opinions of speakers.

In alluding to this original view of Dr. Falconer, and to the able illustration of the whole subject, as detailed in our Proceedings,* I am bound, as a geologist, not to shrink from stating that I agree with him. I beg also to take this opportunity of recording my own opinion of the effects which glaciers have produced in those tracts where they formerly existed, or where they now prevail, as founded on the observations of many good observers, as well as on my own researches. Until lately most geologists seemed to be agreed that the numerous deep openings and depressions which exist in all lofty mountains were primarily due to cracks, rents, and denudations, which took place during the various movements which each chain had undergone at various periods. These apertures, it was supposed, were necessarily enlarged by long diurnal atmospheric agency and the action of torrents carrying down boulders and detritus; such action being most intense in those mountains where snows and glaciers prevailed, the melting of which necessarily produced great débâcles. In the place of this *modus operandi*, another theory has been applied to all those mountains, which, like the Alps, have been for long periods the seat of glaciers.

Before I enter on the consideration of the new theory of the power of moving ice, let us take a review of the progress recently made in pointing out the extent to which ancient glaciers and their moraines have ranged within or on the flanks of the Alps. In the northern portions of the chain these phenomena long ago attracted the attention of some admirable observers. Originating with Venetz and Charpentier, the true active powers of glaciers were defined by Rendu, Agassiz, and Forbes, and subsequently by the other explorers. In short, no doubt any longer obtains, that such was the powerful agency of the grand ancient glaciers, that blocks of crystalline rock were transported by them from the central Alps of Mont Blanc to the slopes of the Jura Mountains. When, however, we begin to seek for satisfactory explanations of the method of transport of these huge erratics, geologists (who are only geographers of another order) entertained different opinions. For my own part, I have had strong doubts as to whether the great blocks derived from Mont Blanc, and which lie on the slopes of the Jura, were ever borne thither by a vast solid glacier which advanced from the Lake of Geneva over the Cantons of Vaud and Neuchâtel. Whilst fully believing in the great power of glaciers and their

* 'Proceedings of Royal Geographical Society,' vol. viii. p. 38.

agency, my opinion was that these blocks were rather transported to their present habitats on the Jura on ice-rafts, which were floated away in water to the N.N.W., when the great glaciers melted, and the low countries were flooded. I founded this opinion on the fact, that in examining the Canton de Vaud, and particularly the tracts near Lausanne and the north side of the Lake of Geneva, I never could detect the trace of true moraines. In that detritus I saw merely accumulations of loose materials, which had all the aspect of having been accumulated under running waters. But, even granting to the land-glacialists their full demand, and supposing that a gigantic glacier was formerly spread out in fan shape, as laid down by several geologists and recently in the little map of Sir Charles Lyell, in his work on the *Antiquity of Man*, and that it became eventually of such enormous thickness as to have carried up the great blocks on its surface, to lodge them on the Jura Mountains; there is still in it nothing which supports the opinion, as indeed Sir Charles has himself observed,* that the deep cavity in which the lake lies was *excavated* by ice.

The geologists who first embraced the view of the transport of the huge blocks on the Jura by a solid glacier, were of opinion, that the great depressions and irregularities of the surface which we now see between the Alps and the Jura, including the Lakes of Geneva and Neufchatel, were so filled up with snow and ice, that the advancing glaciers travelled on them as bridges of ice, the foundations of which occupied the cavities.

Let us now turn to the south side of the Alps, where a long incline accounts for the enormous extension of glaciers into the plains of Italy. Thus, in examining the remains of the old glaciers which once advanced into the valley of the Po, MM. Martins and Gastaldi show us, that one of those bodies extended from Mount Tabor to Rivoli, a length of 50 miles; and, therefore, was longer than any existing glacier described on the flanks of the Himalayas; † whilst those to the south of the Lago di Garda are shown to have had a much greater length. Demonstrating, along with many other authors, how these old glaciers had striated and polished the hard rocks through or on which they had advanced, these authors also clearly pointed out how the course of the glaciers had been deflected, so as to take a new direction, when they met with the obstruction of any promontory of hard rock. Further, M. Martins, being well

* See '*Antiquity of Man*,' p. 312.

† Bull. Soc. Géol. de France. 1850.

acquainted with Norway, indicated that, just as in that country, the face of each rock in a valley was rounded off, polished, and striated where it had been opposed to the advancing mass of ice, and that its opposite or downward face, over which the ice had cascaded or tumbled, was left in a rough state; thus exhibiting the worn or "stoss-seite," and lee, or protected side, of the Scandinavian geologists. The subsequent works of M. Gastaldi on the geology of Piedmont, in 1853 and in 1861, bring within well-defined limits the phenomena of old moraines and ancient drift, and prove that the débris carried over each gorge and valley has been derived from the rocks which specially encase such depressions. He also clearly demonstrated that in many of these cases the gigantic boulders, which are piled together and present the character of a cataclysmal origin, can all be accounted for simply by the power of advancing ancient glaciers. In these works M. Gastaldi very properly distinguishes between the erratic blocks which were evidently parts of old terrestrial moraines, and those which, associated with tertiary strata, are found in deposits with marine shells—the larger erratics in the latter, as in the Superga, having been transported in masses of ice which floated on the then sea.

Various other Italian authors have occupied themselves with glacial phenomena (particularly Omboni, Villa, Stoppani, Cornalia, Paglia, Parolini, &c.): the conclusion at which they have all arrived is, that there existed an enormous extension of the moraines sent forth by the ancient Alpine glaciers into the great valley of the Po. Geographers who have not studied the phenomena may well indeed be surprised when they learn, that the hills to the south of the Lago di Garda, and extending by Pozzolengo and Solferino to Cavriano,* or the very ground where the great battles of the year 1859 were fought (the hill of Solferino being 657 English feet above the sea), are simply great moraines of blocks and gravel, produced by the advance of former glaciers which issued from the southern slopes of the Alps.

Combining these observations with others of his own on the lake of Annecy, M. Mortillet suggested in 1862 a new theory, in attributing to the descent of the glaciers a great excavating power. Believing, with all those who have been named, as well as the most eminent of the Swiss and French geologists, that the last great upheavals and denudations of the Alps had produced the irregularities

* See Paglia—'Sulle Colline del Terreno Erratico all' estremità meridionale del Lago di Garda' (with map).

of their surface, he inferred that before the glacial period began, the *débris* derived from the wear and tear of the mountains by watery action had, to a great extent, choked up the valleys and filled the rock-basins. He further believed that, in the cold period which followed, great glaciers, descending with enormous power, forced all such *débris* out of the original rock-basins, and left them to be occupied by the present lakes. It is proper here to state that M. Gastaldi was right, as well as M. Mortillet, who followed him, in presuming that great deposits of old water-worn alluvium or loose drift were accumulated before the formation of glaciers, inasmuch as the oldest moraines are seen to repose in many places on the former. It will presently be shown that this fact contains within it the proof that the glaciers were not and are not in themselves excavating bodies.

Preceding M. Mortillet, however, in reasoning upon the excavating power of former glaciers, my eminent associate Professor Ramsay had broached a much bolder theory. In his essay entitled 'The Old Glaciers of Switzerland and North Wales,' published in 1859, and re-published with additions in 1860, he expressed the opinion that the excavation of deep hollows in solid rocks was due to a weight of superincumbent ice pressing and grinding *downwards and outwards*, over high, flat, and sometimes broad watersheds and table-lands, during that period of intense cold which produced the old glaciers.* In 1862 he went still further; and whilst M. Mortillet was communicating his views on the Continent, Ramsay, wholly unconscious of what M. Mortillet was doing, read a memoir to the Geological Society of London, showing that all the cavities occupied by lakes in Switzerland and the North of Italy had been excavated originally by the action of glacier ice. Whatever, therefore, be the fate of this ingenious view, Professor Ramsay has our thanks for having excited much useful inquiry, and for having compelled old geologists like myself to reconsider our conclusions.

If the view of M. Mortillet has been met with objections, still more is the theory of Ramsay opposed, and particularly in foreign lands. In this country it has indeed met with the most vigorous opposition on the part of Dr. Falconer, as recorded in our Proceedings; and even Sir Charles Lyell, the great advocate of the power of existing causes, has stoutly opposed this

* See 'Peaks, Passes,' &c. (Alpine Journal, 1859), and 'The Old Glaciers of Switzerland and North Wales,' London, 1860, p. 110.

bold extension of a most powerful *vera causa*.* Having explored the Alps, at various intervals, for upwards of forty years, I long ago came to the conclusion that their chief cavities, vertical precipices, and subtending, deep, narrow gorges, have been *originally* determined by movements and openings of the crust, whether arranged in anticlinal or synclinal lines, or not less frequently modified by great transversal or lateral breaks, at right angles to the longitudinal or main folds of elevation and depression. Explorations of other mountainous regions, in various parts of Europe, have strengthened this conviction. I rejoice, therefore, to find that those geologists of Switzerland, who justly stand at the head of their profession, Professor Studer and M. Escher von der Linth, have sustained, by numerous appeals to nature, the views I hold in common with the great majority of geologists. Those Swiss explorers, who have laboured for many years in their native Alps, and have constructed admirable geological maps of them, must surely be well acquainted with the ruptures of the various rocks, the outlines of which they have sedulously followed. Now, they attribute most of those deep cavities in which the rivers and lakes occur either to dislocations producing abrupt fissures, or to great foldings of the strata leaving openings upwards where the tension has been the greatest—openings which were enlarged by powerful denudations. Numerous geologists have recently expressed their concurrence in the generally-adopted view, that the Alpine lakes occupy such orographic depressions; and, by close researches, my accomplished friend Mr. John Ball† has ably sustained this view, and has further shown how slight is the erosive power of a glacier even when issuing from its main source. No one of them, in short, any more than Professor Studer and myself, doubts that the origin of these lakes is primarily due to other causes. Nor am I aware that any geologists of France and Germany, much as many of them have examined the Alps, have deviated from the opinion that the main diversity of outline in that chain was due to ruptures and denudations that occurred during the upheavals of the chain.

On the other hand, I am bound to state that, although the new theory has met with little or no favour on the continent of Europe, it is supported by our able geologists, Jukes and Geikie. Again, whilst Ramsay extended his view to the great lakes of the Alps, the eminent physicist Tyndall speculated even upon all the Alpine

* See 'Antiquity of Man,' pp. 316 *et seq.*

† See 'Phil. Mag.' 1863.

valleys having been formed by the long processes of the melting of snows and the erosion of ice.* With every respect for the reasoning of my distinguished countrymen, I rely upon my long acquaintance with the structure of the Alpine chain; and now that I see sound practical geologists, who have passed their lives in examining every recess of those mountains, rejecting this new theory, and pointing out, in place of it, the proofs of ruptures and denudations in the chain, I adhere firmly to the view I have long entertained.†

Those who wish to analyse this matter, must consult the admirable essay of Professor Studer on the origin of the Swiss lakes.‡ They will find numerous proofs of the views sustained by the leader of Alpine geologists. He shows you, indeed, how many of the rivers now flow in fissures or deep chasms in very hard rocks of different composition; chasms which water alone could never have opened out, particularly in those cases where the river has left a softer rock, and, with very slight obstacles to its straight course, has availed itself of one of these deep transverse natural gorges, which have evidently been produced by a great former rent. My personal observations in the Alps, Carpathians, and Ural mountains enable me to confirm this view. As regards the continent of Europe, I should transport you to the Rhine, the Danube, and other great streams, which, flowing through flat countries, with little declivity, never could have eroded those deep, abrupt gorges through which they here and there flow, and which are manifestly due to original ruptures of the rocks.§

* See Tyndall on the Conformation of the Alps, 'Phil. Mag.' vol. xiv., 1862, p. 169, and also Ramsay on the Excavations of the Alps, xvi. p. 377.

† Some remarkable facts have been mentioned to me in a letter by M. Escher von der Linth, as proving the inapplicability of the ice erosion theory to the Swiss lakes. 1st. That the glacier of Rosenlani, which descends from a great altitude, does not enter a low deep narrow gorge of the valley, but forms a bridge over it; and so it is to be inferred, that, as the ancient glacier did not excavate this gorge, still less did it excavate the great valley in which the present glacier is embosomed. Again, he points out that, as the bottoms of many of the Swiss lakes are below the level of the sea, the glacier which is supposed to have excavated the hollow would have to ascend considerable heights to emerge from the depression which it had excavated—an impossible movement, and contradicted by the existing operations of all glaciers.

‡ 'Origine des Lacs Suisses,' Biblio. Univ. et Revue Suisse (Arch. des Sci. Phys. et Nat.) t. xix. liv. de Février, 1864; also Phil. Mag. vol. xxvii. p. 481.

§ The recent Russian exploration of Eastern Siberia has shown how the grand river Amur deflects suddenly at nearly right angles from its course in a comparatively low country, to take advantage of a deep natural rent in the mountains through which it escapes to the seaboard (see p. 201 of the Address).

In holding these opinions as to the small power of watery or glacial action, when not acting on an adequate incline, I do not doubt that glaciers have been, and still are, most important agents in modifying the outlines of mountains. Their summits are, we know, continually degraded by rains and melted snows; and torrents flowing down from them and carrying much detritus, are, doubtless, deepening their channels wherever sufficient slopes occur. But to whatever extent this agency has been and is at work, and to however great a degree a descending glacier may scratch and round off the rocky bottom on which it advances, I coincide with Professor Studer, and many other observers, that the amount of erosion produced by these icy masses, particularly when they have advanced into valleys where there is only a slight inclination, must be exceedingly small. In valleys with a very slight descent it will presently be shown that, even in the Alps, no erosion whatever takes place, particularly as the bottom of the glacier is usually separated from the subjacent rock or vegetable soil by water arising from the melting of the ice. Again, in all the steeper valleys down which ancient glaciers have formerly descended, we do not find that either the sides or bottoms of the upper gorges afford any proof of wide erosion, but only exhibit the peculiar fashioning of the flanking surfaces of the rocks, or that rounding off and polishing, called *moutonné*, accompanied with striations. On the contrary, in gorges whence the largest glaciers have advanced for ages, we meet with islands of solid rock and little bosses still standing out, even in the midst of valleys down which the icy stream has swept.

With such proofs before us of what the frozen rivers called glaciers have done and are doing in the high valleys, how can we imagine, as Dr. Falconer has forcibly put it, that the glacier which is supposed to have occupied the Lago Maggiore, for example, and had advanced its moraines into the plains of the Po, should have had the power to plough its way down to a depth of 2000 feet below the Mediterranean, and then to rise up along an incline at the rate of 180 feet per mile? Nor can I admit the possible application of this ice-excavating theory wherever I see that a depression in which a lake occurs is at right angles to the discharge of an old main glacier. This is remarkably to be noticed in the case of the Lake of Geneva, which trends from E. to W., whilst the detritus and blocks sent forth by the old glacier of the Rhone have all proceeded to the N. and N.N.W.; or in direct continuation of the line of march of the glacier which issued from the narrow gorge of the Rhone. By what

momentum, then, was the glacier to be so deflected to the west that it could channel or scoop out, on flat ground, the great hollow now occupied by the Lake of Geneva? And, after effecting this wonderful operation, how was it to be propelled upwards from this cavity on the ascent, to great heights on the slopes of the Jura mountains?

Still stronger objections exist to the application of the excavation theory to the Lake of Constance. There I have never been able to see on the northern flank of the Hohe Sentis, which presents its abrupt, precipitous, and highly dislocated and contorted jurassic and cretaceous rocks to the lake, with terraces of miocene deposits, at various heights,—there I have been unable, when with my indefatigable friend and companion M. Escher von der Linth, who knows every inch of the ground, to trace the signs of the action of a great glacier, which could, in its descent, have so plunged into the flat region on the east and north, as to have scooped out the cavity in which the Lake of Constance lies. In this case, indeed, there are no traces whatever of those great old moraines from the relics of which we infer that glaciers have formerly advanced; the level country to the north of the lake being entirely free from them.

Great orographic depressions and deep cavities, sometimes dry, sometimes filled with water, occur in numberless countries where no glaciers ever existed. Thus, in Spain, as my colleague M. de Verneuil assures me, the large depressions on either side of the granite mountains of the Guadarramma present exactly the appearance which a theorist might attribute to excavation by ice, and yet, however these cavities were formed, it is certain that no glacier has ever existed there. Nor, again, has ice ever acted on the sides of the steep mountains of Murcia, where deep excavations and denudations are seen upon the grandest Alpine scale.

If we transport ourselves from those southern climes to the northern latitudes of the Ural mountains, where doubtless ice and snow formerly prevailed to a greater extent than now, we do not there find any proof whatever of the action of glaciers; for the hills are much too low to have given propulsion to such masses. On the contrary, we know that great blocks of hard rocks have been transported to the foot of these hills from Lapland and Scandinavia, when, during the glacial period, a vast Arctic Sea watered the flanks of the Ural mountains, and when most parts of that low chain could then have been only slightly elevated above

the waters. And yet on the sides of this chain, where no glaciers have ever so acted as to have produced erosion, we meet with both longitudinal and transverse deep fissures in some of which lakes, and in others rivers, occur. Thus, all along the eastern flank of the Ural mountains we find a succession of depressions filled with water without a trace, on the sides of the bare and hard rocks which subtend these lakes, of any former action of glaciers. Then, as to deep valleys in which rivers flow, let us take two out of the examples along the western flank of this chain, on which my companions De Verneuil, Keyserling, and myself have specially dwelt in our work on Russia. The Serebrianka river, as it issues from a network of metamorphic schists, quartz rocks, and marbles of Silurian age, exhibits on its rugged banks the extrusion of much igneous matter. This agency has split up the stratified deposits; and the necessarily accompanying movements have caused great openings, including the cavity in which the river flows. Or, when the geological traveller passes from the valley of the Serebrianka to that of its recipient, the Tchussovaya, still more is he struck with wonderment at the unquestionable evidences, amidst intensely dislocated rocks, of the ruptures by which the deep narrow chasm has been formed in hard crystalline rocks, in which a lazy stream flows, which, not descending from any altitude, has had no excavating power whatever, and, like our own meandering Wye, has flowed on through clefts in limestone during the whole historic and prehistoric period, without deepening its bed.*

But if rivers which are not torrential, and do not descend from heights, cannot possibly have produced, nor even have deepened, the natural hollows or chasms in which they flow, still it might be contended, that, what water has not effected, may have been done by a river, when, in the compacter form of ice, it descended and advanced across the lower country. Unluckily for the supporters of the ice-excavating theory, the data which existing nature presents to us, as before said, are decisively opposed to their view. The examination of those tracts over which glaciers have advanced, and from which they have retreated, shows, in the most convincing manner, that ice has so much plasticity that it has always moulded itself upon the inequalities of hard rocks over which it passed, and, merely pushing on the

* For a full description of the abrupt gorge of the Tchussovaya, see 'Russia and the Ural Mountains,' vol. i, p. 352 *et seq.*

loose detritus which it meets with, or carries along with it from the sides of the upper mountains, has never excavated the lateral valleys, nor even cleared out their old alluvia. This fact was well noticed by the Swiss naturalists, as evidenced by present operations, at their last meeting in the Upper Engadine, and has been well recorded by that experienced and sagacious observer of glacial phenomena, M. Martins.*

Since that time the able French geologist, M. Collomb, who was associated with Agassiz in his earliest researches on glaciers, and has been the companion, in Spain, of my colleague M. de Verneuil, has recently put into my hands the results of his own observation upon the present and former agency of the glaciers of the Alps, which decisively show that ice, *per se*, neither has nor has had any excavating power.† None of the glaciers of the Alps cited by M. Collomb, viz. those of the Rhone, the Aar, the Valley of Chamounix, the Allée Blanche, and the Valley of Zermatt, produce any excavation in the lower grounds over which they pass. That of Görner, which, among others, is advancing, affects very slightly the surface of the meadows on which it proceeds, and does not penetrate into the soil. Again, where the glacier of the lower Aar pushes, on its front, upon accumulations of the débris of old moraines and gravel, it scarcely deranges these materials, but slides over them, leaving them covered with mud and sand, but not excavating them. Also, the glacier of the Rhone, the principal part of which can be so conveniently studied, advances on a gravelly substratum, in which it does not form a channel. Such being the facts as regards glaciers now advancing, M. Collomb cites equally strong, if not still stronger, cases, in support of his view, as derived from the observation of retiring or shrinking glaciers in the valleys of the Alps. Examining last year with M. Daubrée the glaciers of the Valley of Chamounix, he was attracted to that named Bossons, which he had not seen for five years. During that time the glacier had shrunk very considerably, both in altitude and length, and yet upon the surface of the ground from which it had retired there was not the smallest sign of excavation.

Viewing a glacier as a plastic body, we know that it is pressed onwards by gravitation from the increasing and descending masses

* See 'Revue des Deux Mondes,' Mars, 1864. The former observations of M. Martins on Norway and on the Alps are of the highest importance.

† I may add that M. de Collomb expresses that which I believe to be the opinion of Elie de Beaumont, d'Archiac, de Verneuil, Daubrée, and all the leading French geologists.

of snow and ice behind it in the loftier mountains, and being forced to descend through narrow gorges, it naturally acts with the greater energy on the precipitous rocky flanks of these openings; striating and polishing them with the sand, blocks, and pebbles which it holds in its grasp. But, as before touched upon, the narrowness of many of those channels through which glaciers have been thrust for countless ages, is in itself a demonstration that the ice can have done very little in widening the gorge through which it has been forced, and where, of necessity, it exerted by far its greatest power. In other words, the flanking rocks of each gorge have proved infinitely more stubborn than the ice and its embedded stones, which have merely served as graters and polishers of the granites, quartz rocks, porphyries, slates, marbles, or other hard rocks, among which the frozen river has descended. And, if such has been the amount of influence of advancing glaciers in the higher region, where the body descends with the greatest power, how are we to believe that when this creeping mass of ice arrived in low countries (as for instance in the depressions occupied by the Lakes of Geneva and Constance) it could have exerted a power infinitely greater than that which it possessed in the higher regions?

When we turn from modern glaciers to the remains of those of ancient date, the proofs are equally decisive, that, whatever might be their extent, those gigantic bodies exercised no excavating power. I am reminded by M. Collomb, as well as by M. Escher von der Linth, that in many parts of the Alps, vast old moraines repose directly on incoherent and loose materials of quaternary age; the old drift of the Alps, containing *Elephas primigenius* and *Rhinoceros tichorhinus*. Well may we then ask, how is it that the ancient and larger glaciers, which were supposed to have had such enormous excavating power as to have scooped out deep valleys in hard rocks, should not have entirely destroyed the loose accumulation of gravel over which they have been spread? Or, if glaciers excavated the Lago di Garda and Lago Maggiore, why did they not produce any such effect at Ivrea, in the Valley of Aosta, down which we know that enormous masses of ice travelled; or at Rivoli, in their march from Mount Cenis towards Turin?

Leaving it to physical philosophers, such as Forbes, Faraday, Hopkins, and Tyndall, to show what is the real measure of the abrading power of masses of moving ice, I simply form my opinion from what glaciers are accomplishing, or have accomplished. Judging from positive data, I infer that if, as agents, they have been wholly

incapable of removing even the old and loose alluvial drift which encumbered the valleys, infinitely less had they the power of excavating hard rocks. At the same time I know that, in every mountain tract which I have examined, there have been quite a sufficient number of rents and denudations to account for all inequalities. These openings have doubtless been greatly increased by the atmospheric agencies of ages, and particularly in all those situations where water has acted with great power, during the melting of glaciers.

I have made these observations (which I could largely extend) to show the intimate connection which exists between the science of geology, to which I have been so long devoted, and physical geography. Let me explain, however, that I do not doubt that glaciers have, in certain regions, caused the formation of lakes, though by a very different agency from that of the excavation of rocks. The great glaciers of former times have unquestionably sent forth and discharged still larger accumulations of *débris* than those of our day, which, in the form of high terminal moraines, barred up water-channels, and the result in some mountainous tracts has inevitably been the production of lakes. Among examples of such in Europe, M. Collomb directs my attention to the Gérard-meer, on the western flanks of the Vosges mountains. This lake has been formed by an ancient moraine, which, descending from the Vosges mountains, has been accumulated on old drifted loose materials, which it has not excavated, whilst it has served as a permanent dam to sustain the waters at a height of 1400 feet above the plain of the Rhine, to the east of the Vosges, and nearly 2000 English feet above the level of the sea.

In the grand and loftier cases, however, of Western Tibet, before alluded to, it is scarcely conceivable that icy barriers or moraines in the valleys could have risen to sufficient height to pond back the waters to many thousands of feet above the low country on the south. The bursting of those old vast and lofty mountain lakes was probably, as suggested by Dr. Falconer, determined by the last great upheaval of the Himalayas, which, judging from the very modern character of the organic remains in the upheaved deposits, must have taken place during one of the most recent of geological epochs.

In referring you to my observations of last year on the marvellous effects of those aqueous currents which have transported erratic blocks of stone during the former glacial period, I must attract your notice to a remarkable and faithfully executed new map of Finland by

Professor Nils Nördenskiöld, of Helsingfors, which illustrates an able memoir by that author on the scratched and polished surfaces of the rocks of his native country.* Carefully taking the direction of every one of the innumerable sets of parallel scratches over a region larger than Great Britain, he shows, that everywhere the direction of these groovings and scratches is from north-west to south-east, with slight local deviations only. Again, the worn sides (*stoss-seiten*) of each hard rock which has been scratched, worn down, and polished, are presented to the north-west, the point from which the force proceeded; and every *lee*, or protected and rough side, lies to the south-east. On the coast of Finland these groovings are even observed to extend in one place from many feet under the surface of the sea. Seeing that the force which produced these groovings and scratches came from beyond the Gulf of Bothnia and the low country of Sweden, and has operated with such uniformity over a vast region, parts of which rose to about 1000 feet above the Bothnian Gulf, he necessarily refers the phenomena to powerful marine currents. These took place when Finland, as well as all Northern Russia and Germany, lay under the sea, and when the chief groovings were made by stones and blocks, which were held fast in the bottom of floating icebergs, when they were arrested on submarine banks or points of rock. He also indicates how the erratic blocks dropped by these icebergs are found to be more and more rounded as they have receded from the source of their origin, or how, in drifting to the south-east, they have consequently been more exposed to wear and tear. The quantities of sea-sand which abound, and the accompanying small and waterworn pebbles and gravel, have, of course, assisted in the polishing of the rocks. The sand-ridges and pebble-beds which abound in Finland are, in fact, nothing different from the *Ösar* of the Swedish geologists; and thus the drift phenomena on either side of the Gulf of Bothnia are shown to be identical sub-aqueous deposits.

Here, then, we have a vast region of Europe in which it is manifest that no land-ice or glacier could ever have acted, inasmuch as the area from whence the force was directed was manifestly far to the north-west of the Gulf of Bothnia, and the low countries of Sweden, which, equally with Finland, are covered with erratic blocks and aqueously transported drift. Neither in the south of Sweden nor in Finland are there any moraines, all the detritus

* 'Beitrag zur Kenntniss der Schrammen in Finland.' Von N. Nördenskiöld. Helsingfors, 1863.

around the great erratics being water-worn; and yet the scratched and polished surfaces, the worn and abrupt sides of the hillocks, in both these countries, resemble precisely the *roches moutonnées* seen in the march of every existing glacier. Agreeing, as I do entirely, with Professor Nördenskiöld (for in my published works I have maintained the same view as regards the southern parts of Sweden, and all Northern Russia, Prussia, and Germany),* I also agree with him in the conclusion that the depressions in the surface of Finland, which are now occupied by innumerable lakes, are those which existed when the country was a sea-bottom, and that the present lakes simply occupy the hollows which existed when Finland was raised from beneath the waters. In a table giving the lithological structure of each rock *in situ* which has been grooved, it is shown that the depth of the scratches bears an exact relation to the hardness and resisting nature of the rock. The map—on which every lake and the numerous scratched surfaces are marked, as well as all the altitudes—is a work which must elicit the admiration of every geographer and geologist, and does such honour to Professor Nördenskiöld, that our Council has justly placed him in the list of our Honorary Members.

The lines of striation, so carefully laid down by Nördenskiöld in Finland, I have myself found extending in the adjacent low regions of Russia, and notably upon the hard quartzose rocks forming the sides of the lake Onega, at a distance of 500 miles from the Bothnian Gulf. There, also, they are seen to be continuous from the shore under the water of the lake, being visible at some feet below the surface. In this flat or slightly undulating country we have all the same proofs as in Finland, that these scratches, groovings, and polishings could only have been produced by stones carried in icebergs; and there, as in Finland, the great erratics, referable to the north-western parts of Norway, have been dropped at numerous intervals, some of them from Lapland, extending to the western flank of the Ural mountains. In the work and map of "Russia and the Ural Mountains," published by myself and companions De Verneuil and Keyserling, the enormous area over which these erratics were transported during the period when the glacial sea covered Russia in Europe and Northern Germany was defined. It was then for the first time made manifest that the currents which transported these blocks had eccentric directions. Thus, whilst the blocks in Finland

* See 'Russia in Europe and the Ural Mountains,' vol. i. chapters 20 and 21. Also, 'Quart. Jour. Geol. Soc.,' vol. ii. p. 349.

and Northern Russia had proceeded from N.W. to S.E. (having been derived from the old north Norwegian ice-fields), the blocks which covered the plains of Prussia, and extended over Poland up the great valleys, on to the foot of the Carpathians, being also of Scandinavian origin, must have been brought from north to south when all those lands were under the sea. On the east of England the great Scandinavian erratics came from the west coast of Norway, whilst in Lapland, M. Böttlingk had shown that the blocks were diverted northwards into the icy sea.

These facts of the divergence of the distribution of the erratics, as due to divergent currents, are quite in harmony with what would be found at the present day, if the bottom of the sea could be so laid bare as to enable us to refer to the various north or south polar glaciers, or to those of Greenland, the devious lines of deposit of the blocks derived from each of these regions, as determined by different prevailing currents.

If we refer to what glaciers have effected upon land, and to those phenomena which could only have been produced when the rocks so affected were submarine, we must admit that two distinct modifications of the same great agency have produced similar results. The great mass of low country in North America, the surface of which has been striated in like manner from north to south, seemed to me long ago to fall into the category of subaqueous striation by floating icebergs, which were here and there arrested in their progress by sunken rocks. When presiding over the Geological Society of London, in 1842, I gave all credit to Mr. Peter Dobson, a citizen of the United States, for the adoption of that view in reference to his native land,—a previous acquaintance with whose writings, I then said, might have saved volumes of disputation on both sides of the Atlantic.* And now, after a lapse of 22 years, I hold to the same belief.

In the admirable work of Sir W. Logan on the 'Geology of Canada,' my eminent friend expresses the opinion, "that the grooves on the surfaces of the rocks which descend under the water appear to point to glacial action as one of the great causes which have produced these depressions."† Not having visited the region myself, I should have no right to oppose my opinion to that of such weighty authority,

* See 'Anniversary Address, Proc. Geol. Soc.,' vol. iii. pp. 686 *et ante*.

† 'Report of Geological Survey of Canada, 1863,' p. 889 and note *ib*. Montreal.

were it not that the grounds assigned for believing in the excavating power of glaciers in North America are the same striations on the sides of the lakes, and beneath the water, as those which I have cited from the shores of the Bothnian Gulf and the lake of Onega in Northern Russia. Now, as regards the latter countries, I have shown that land glaciers could never have passed over them; for surely no terrestrial glacier in advancing to Finland and Northern Russia can have scooped out the Bothnian Gulf by the way! Instead of such striation on the sides of rock-basins, now filled with water, being proofs of the grinding and excavating action of former glaciers, particularly in the cases of Finland and North America, where no lofty mountains, as in the Alps, are at hand to give great power to descending masses of ice, I conceive that such phenomena can only be explained by appealing to the grating action of the bottom of former floating icebergs. My belief is, that the great North American lakes were cavities originally due to a combination of ruptures and denudations of the rocks, and that the whole surface of the lower country thus prepared, was under the sea when icebergs coming from Arctic glaciers floated over it.

We can thus well imagine how countless icebergs were here and there arrested on those submarine rocks which now form the sides of the lakes, and how each icy mass, forced on by a powerful current, after producing the well-known striation on the points of stoppage, would necessarily, when set free, float rapidly across the deep sea cavity, until the base of the iceberg was again arrested by the prominences on the opposite side of the depression, there again to make striations with the stones held fast in its bottom. In this way we can just as easily account for the transport of the numerous great erratics which are spread over North America up to 38° N. latitude, as we have explained the transport of the Scandinavian blocks up to the foot of the Carpathian Mountains.

Whilst, therefore, I fully recognise the stupendous spread and influence of former land-glaciers over extensive regions, I at the same time affirm, that as regards the striation and polishing, the worn side and the abrupt side of the rocks affected, floating icebergs, when impeded by submarine obstacles, have also produced those results. The true and independent test of the action of terrestrial glaciers is the existence of moraines. Now, there is no

trace of these peculiar accumulations in the South of Sweden and Finland, all the detritus of those regions, as well as of the North of Russia and Germany, being waterworn; and I have yet to learn that there are any evidences of true moraines in the low countries of Canada and the United States.*

[Whilst I was reading this Address to the Geographers in London, that sound practical geologist, Principal Dawson, was performing a similar duty at the Annual Meeting of the Natural History Society of Montreal. Having received a copy of his Address in time for insertion of a Postscript here, I rejoice to have the opportunity of stating that he also is a vigorous opponent of the theory which refers the striation of the North American rocks, and the excavation of the great lake basins of that country, to the action of terrestrial glaciers. He shows indeed that the great striation of a large portion of the continent from N. E. to S. W. was from the ocean to the interior, against the slope of the St. Lawrence valley, thus disposing at once of the glacier theory; for it is impossible to imagine that a glacier travelled from the Atlantic up into the interior. Admitting that in limited tracts of Eastern America there may have been local glaciers, Mr. Dawson believes, as I do, that the chief countries in question were striated when the land lay beneath the sea.]

AFRICA.

North-western Africa.—Senegal and its Dependencies.—Looking to the well-digested and clear accounts of the progress of geographical research in Northern or North-western Africa, which have been embodied in the Reports of the Geographical Society of France, by M. Malte Brun, I have only to refer you to those works, and not detain you on this subject by any observations of my own. I am, however, impelled to call your notice to a work of this year 1864, the '*Annuaire de Sénégal*,† as followed by a *résumé* of the explo-

* For a full explanation of my views respecting the manner in which former floating icebergs transported blocks, and spread out submarine detritus, I must refer the reader to the 21st and 22nd chapters of the work '*Russia and the Ural Mountains*,' pp. 507 to 556. Since that time (1845) I have indeed seen reason to admit a much greater extension of former land-glaciers than my colleagues and myself then believed in, and this I explained in my last Address to the Royal Geographical Society.

† Printed at St. Louis, Senegal, 1864. Paris, chez Challamel aîné, Rue des Boulangers, 30.

rations of the interior, made by order of the Government, in the years 1859, 1860, and 1861, and which has just fallen into my hands. Whenever our allies the French describe any one of their possessions, it is invariably done with method, order, and a lucid condensation of details; and such qualities are particularly observable in this little volume. Discovered in 1460 by some bold navigators of Dieppe, Senegal was soon after colonised by the same Normans. In succeeding centuries the Portuguese and Dutch warred for the occupation of these tracts, until 1758, when the English took the country, including Goree, but ceded it again to France by treaty. Again, in 1800, Goree fell into our hands, and in 1809 we added to it St. Louis; but, at the conclusion of the last great war in 1814, the whole territory was rightly given back to France, its original occupant. Holding possession of this territory for the last fifty years, the French have striven energetically to improve it, by a vast enlargement of boundary, the construction of forts, strict military tenure, and by carrying on a commerce with the adjoining native tribes; so that they reckon upon having 200,000 subjects, and, after several years of war, they are now in relation with about a million of natives.

In the long list of annexations of native districts, it is gratifying to read, as a sequence of the last treaty of peace, that a telegraphic communication is now established between St. Louis and Goree, and that in 1863 the new port of Dakar was formed. Recently the quiet state of the political horizon has enabled the Governor, Colonel Faidherbe, who has been the mainspring of French progress in Senegal, and who has recently been named one of our Honorary Foreign Members, to send various exploratory parties along the north coast and into the interior of the country. These have added much important information to the sketches of tracts formerly visited by the Père Labat, Mungo Park, Caillé, Mollien, and Panet. The French colonists, since their occupation of Algeria, have sagaciously sought for original knowledge in the native recitals of Arabs, and the inhabitants of Soudan and Berber. With these data, and in acquiring the language of the natives, several travellers,—such as Captain Vincent; MM. Bournel and Mage, young Naval officers; Pascal and Lambert, Infantry officers; with Alioun Sal and Bough-el-Moghdad, intelligent Native officers in the French service,—have, in the years 1859, 1860, and 1864, made most successful journeys. Thus, the portion of Soudan adjacent to Senegal is now nearly as well known as the more central

regions, which have been already developed by British explorations, including those of Denham, Clapperton, and W. Lander,* and the works of our honoured Associate Barth. One of these parties, Alioum Sal, reached Timbuctoo; and the death of this young and intelligent Mohammedan, who unfortunately fell a prey to the fever of the country, has been deeply lamented by the authorities of Senegal.

Before quitting the subject of North-western Africa, I am unwilling to pass unnoticed the services of the enterprising young German traveller Gerhard Rohlfs, who, having made a successful journey through Southern Morocco by Tafilet to Gerysville in Algeria, is now on his route to Timbuctu under the auspices of the Royal Geographical Society.

Northern Abyssinia.—The efforts of our German contemporaries to complete our acquaintance with Northern Abyssinia and the adjacent countries (of which mention was made in a note to my last year's Address), have been most successful; and every geographer must have heartily commended the researches of Von Henglin, Kinzelbach, Munzinger, and Steudner. Whilst these travellers have prepared an excellent detailed map of the districts of Bogos, Manesa, and Murca, with the surrounding tracts, a more extended map, ranging from the Red Sea on the east to $34^{\circ} 45'$ E. longitude, which has resulted from their surveys, is a work of great and general interest. For, in it, we find the routes laid down of all the travellers of various countries during the last quarter of a century, who have examined the regions between Massiwa and the coast of the Red Sea on the east, and the river Atbara, that great affluent of the Nile, on the west. This sheet, as published in the 'Mittheilungen' of Petermann, is an excellent example of the amount of knowledge which can be conveyed on a map alone; the successive journeys of the different travellers being laid down in different colours with border profiles showing the relative heights of the different countries traversed.

* I have just had the gratification to learn that, with a due appreciation of the devoted and zealous researches in Central Africa of that accomplished young traveller Edward Vogel, who was barbarously beheaded by the King of Wadai, Earl Russell has granted the sum of 500*l.* to Miss Julia Vogel, the sister of the deceased. In thanking me warmly for supporting her cause, this lady assures me that, by this generous act, all her prospects in life are brightened, and that her heart's desire will now be fulfilled in being enabled to do honour to the memory of her lamented brother, as well as, she says, "to assist a younger brother in those studies which may enable him to serve a country to which she will ever cling with the deepest gratitude."—24 June, R. I. M.

The Niger.—The last accounts I have seen of the labours of Dr. Baikie are contained in a private letter to a relative, dated at Lukoja, on the 9th October, 1863. This persevering and praiseworthy envoy of our Government, who has been seven years in Africa and in whose appointment I took much interest, had, it appears, made up his mind to come home last year, when he received instructions to remain at his post till further orders.* In braving the dangers of the climate, Dr. Baikie has shown how a British settlement can be made a centre of civilization. Alone, and almost without means, he has contracted friendships with all the leading chiefs of Soudan, and has awed tribes merely by the exercise of moral influence, whilst his messengers can now travel securely from his station to Bonny.

It is by such an example and such persevering conduct that Africa can be best civilized; and we must earnestly hope that whoever may succeed Dr. Baikie, will follow the same kind, judicious, and forbearing conduct which has endeared him to the natives, and has enabled him to make his little station, so far up the Niger, a centre of commerce and friendly intercourse with them.

The Gaboon Country.—Although the progress of the recent expedition of M. du Chaillu to the scene of his former explorations has been unluckily checked by the loss of his scientific instruments, I trust that when he receives the fresh supply sent out to him by us, he will make a successful examination of the interior in those latitudes. He has, indeed, already sent home instruments, including the native harp with strings of vegetable fibre, which prove the truthfulness of some of his descriptions which had been unjustly discredited. As regards his previous accounts of the geography of the Gaboon country, M. du Chaillu's accuracy, in the main, has been amply confirmed by Lieuts. Serval and Du Bellay, who have since made surveys in the interior.†

South Africa.—*Explorations of the Baron C. von der Decken.*—*The unchanged terrestrial condition of the ancient Surface of the Interior of South Africa.*—*Project of rendering the White Nile the highway of intercourse between Central Africa and Europe.*—*Petherick's Journal.*—Whilst our last Session closed with the striking results of the journey of Speke and Grant, and our warm welcome of the undaunted travellers, who, for

* As this Address is printing, Mr. Layard informs me that the *Investigator* steamer has been ordered to bring Dr. Baikie down the Niger, and that he may be expected home this year.

† Vide Petermann's 'Mittheilungen,' December, 1863. Messrs. Serval and Du Bellay have discovered a new and broad river, the Ogowai, flowing from the interior, about 20 leagues to the south of the Gaboon.

the first time in history, had crossed Equatorial Africa and had also descended along the course of the great White Nile from its water-basin to its mouth, the opening of this Session was marked by the interesting and detailed description of the snow-clad mountain Kilimandjaro, the issue of two expeditions conducted entirely at his own cost by Baron C. von der Decken.

In the first of these, he was accompanied by my clever and lamented young friend, the late Mr. Richard Thornton, who drew the first contoured map of that wild and lofty country, took many observations of latitude and longitude, and kept an accurate diary. Copies of all his writings, as well as his original map, have now been sent by his family to the Royal Geographical Society.* In the second expedition, Baron von der Decken had for his scientific companion a German astronomer, Dr. Kärsten.

I have already adverted at some length to the importance of this enterprise, as recorded in our 'Proceedings,' and also in the award of the Medal. I have informed you that, in reference to the prosecution of other enterprises by the same distinguished person, the First Lord of the Admiralty had given directions that Her Majesty's vessels on the coast of Africa should assist the Baron in passing his own steamer into one of the rivers of Formosa Bay; and I have now to state that Her Majesty's Secretary for Foreign Affairs has strongly recommended this enterprising traveller to the good-will of the Sultan of Zanzibar, through the British Consul at that place. Seeing that Baron von der Decken, who has already done so much, is organising at considerable expense another expedition, in which, providing himself with an iron river-steamer, he will be attended by competent observers, we naturally wish him all the success which his zeal and devotion to our cause merit.

If, after ascending one of the rivers which fall into the Bay of Formosa, he should reach Mount Kenia or any part of that mountainous region of Eastern Africa, north of the Kilimandjaro, probably a great watershed, and should thence descend by any eastern affluent of the White Nile, or should reach Egypt by the Blue Nile, in either case he will have performed a most essential service to geography. In the mean time, both for the great and good duties he has already performed, and for the extensive and vigorous preparations he is now making to enlarge our acquaintance with the geography of Africa, the Council has in my opinion wisely adjudicated a Gold Medal to Baron C. von der Decken.

* See my observations on the late Richard Thornton in the Obituary, p. 184.

Our Victoria Medal has, with great propriety, been awarded to the gallant Captain Grant,* the companion of Speke, to mark, as I have said, emphatically and once more, our sense of the vast importance of their journey across Equatorial Eastern Africa, and the region of the head waters of the Nile. By their researches the watershed between North and South Africa was first established in respect to the Eastern Equatorial region. The results which ought to follow from these discoveries will be further considered in the sequel.

In former Addresses I suggested that the interior mass and central portions of Africa constituting a great plateau occupied by lakes and marshes, from which the waters escaped by cracks or depressions in the subtending older rocks, had been in that condition during an enormously long period. I have recently been enabled, through the apposite discovery of Dr. Kirk, the companion of Livingstone, not only to fortify my conjecture of 1852, but greatly to extend the inferences concerning the long period of time during which the central parts of Africa have remained in their present condition, save their degradation by ordinary atmospheric agencies. My view, as given to this Society in 1852, was mainly founded on the original and admirable geological researches of Mr. Bain in the colony of the Cape of Good Hope. It was, that, inasmuch as in the secondary or mesozoic age of geologists, the northern interior of that country was occupied by great lakes and marshes, as proved by the fossil reptile discovered by Bain, and named *Dicynodon* by Owen, such it has remained for countless ages, even up to the present day. The succeeding journeys into the interior, of Livingstone, Thornton, and Kirk, Burton and Speke, and Speke and Grant, have all tended to strengthen me in the belief that Southern Africa has not undergone any of those great submarine depressions which have so largely affected Europe, Asia, and America, during the secondary, tertiary, and *quasi* modern periods.

The discovery of Dr. Kirk has confirmed my conclusion. On the banks of an affluent of the Zambesi, that gentleman collected certain bones, apparently carried down in watery drifts from inland positions, which remains have been so fossilized as to have all the appearance of antiquity which fossils of a tertiary or older age usually present. One of these is a portion of the vertebral column and sacrum of a buffalo, undistinguishable from that of the Cape buffalo; another is a fragment of a crocodile, and another of a

* See 'Presentation of Royal Awards,' *ante*.

water-tortoise, both undistinguishable from the forms of those animals now living. Together with these, Dr. Kirk found numerous bones of antelopes and other animals, which, though in a fossil condition, all belonged, as he assured me, to species now living in South Africa.

On the other hand, none of our explorers, including M. Bain, who has diligently worked as a geologist, have detected in the interior any limestones containing marine fossil remains, which would have proved that South Africa had, like other regions, been depressed into oceanic conditions, and re-elevated. On the contrary, in addition to old granitic and other igneous rocks, all explorers find only either innumerable undulations of sandstones, schistose, and quartzose rocks, or such tufaceous and ferruginous deposits as would naturally occur in countries long occupied by lakes and exuberant jungles, separated from each other by sandy hills,—scarcely any other calcareous rocks being found except tufas formed by the deposition of land-springs. It is true that there are marine tertiary formations on the coasts (around the Cape Colony, near the mouth of the Zambesi opposite Mozambique, and again on the coasts of Mombas opposite Zanzibar), and that these have been raised up into low-coast ranges, followed by rocks of igneous origin. But in penetrating into the true interior, the traveller takes a final leave of all such formations; and in advancing to the heart of the continent, he traverses a vast region which, to all appearance, has ever been under terrestrial and lacustrine conditions only. Judging, indeed, from all the evidences as yet collected, the interior of South Africa has remained in that condition since the period of the secondary rocks of geologists! Yet, whilst none of our countrymen found any evidences of old marine remains, Captain Speke brought from one of the ridges which lay between the coast and the lake Victoria Nyanza a fossil shell, which, though larger in size, is undistinguishable from the *Achatina perdis* now flourishing in South Africa. Again, whilst Bain found fossil plants in his reptiliferous strata north of the Cape, and Livingstone and Thornton discovered coal in sandstone, with fossil plants, like those of our old coal of Europe and America,—yet both these mesozoic and palæozoic remains are terrestrial, and are not associated with marine limestones, indicative of those oscillations of the land which are so common in other countries.

It is further to be observed that the surface of this vast interior is entirely exempt from the coarse superficial drift that encumbers

so many countries, as derived from lofty mountain-chains from which either glaciers or great torrential streams have descended. In this respect it is also equally unlike those plains of Germany, Poland, and Northern Russia, which were sea-bottoms when floating ice-bergs melted and dropped the loads of stone which they were transporting from Scandinavia and Lapland.

In truth, therefore, the inner portion of Southern Africa is, in this respect, as far as I know, geologically unique in the long conservation of ancient terrestrial conditions. This inference is further supported by the concomitant absence, throughout the larger portion of all this vast area, *i.e.* south of the Equator, of any of those volcanic rocks which are so often associated with oscillations of the *terra firma*.*

With the exception of the true volcanic hills of the Cameroons recently described by Burton, on the west coast, a little to the north of the Equator, and which possibly may advance southwards towards the Gaboon country, nothing is known of the presence of any similar foci of sub-aërial eruption all round the coasts of Africa south of the Equator. If the elements for the production of them had existed, the coast-line is precisely that on which we should expect to find such volcanic vents, if we judge by the analogy of all volcanic regions where the habitual igneous eruptions are not distant from the sea or from great internal masses of water. The absence, then, both on the coasts and in the interior, of any eruptive rocks which can have been thrown up under the atmosphere since the period when the tertiary rocks began to be accumulated, is in concurrence with all the physical data as yet got together. These demonstrate that, although the geologist finds here none of those characters of lithological structure and curiously diversified organic remains, which enable him to fix the epochs of succession in the crust of the earth in other quarters of the globe, the interior of South Africa is unquestionably a grand type of a region which has preserved its ancient terrestrial conditions during a very long period, unaffected by any changes except those which are dependent on atmospheric and meteoric influences.

If, then, the lower animals and plants of this vast country have gone on unchanged for a very long period, may we infer that its human inhabitants are of like antiquity? If so, the Negro may claim as old a lineage as the Caucasian or Mongolian races. In the absence of any decisive fact, I forbear at present to speculate on

* Although Kilimandjaro is to a great extent igneous and volcanic, there is nothing to prove that it has been in activity during the historic era.

this point; but as, amid the fossil specimens procured by Livingstone and Kirk, there are fragments of pottery made by human hands, we must wait until some zealous explorer of Southern Africa shall distinctly bring forward proofs that the manufactured articles are of the same age as the fossil bones. In other words, we still require from Africa the same proofs of the existence of links which bind together the sciences of Geology and Archæology which have recently been developed in Europe. Now, if the unquestioned works of man should be found to be coeval with the remains of fossilized existing animals in Southern Africa, the travelled geographer, who has convinced himself of the ancient condition of its surface, must admit, however unwillingly, that although the black man is of such very remote antiquity, he has been very stationary in civilization and in attaining the arts of life, if he be compared with the Caucasian, the Mongolian, the Red Indian of America, or even with the aborigines of Polynesia.*

The discovery of that vast water-basin, the Victoria Nyanza, in the heart of Equatorial Africa, and the proof that a great stream flowed out from its northern extremity, which Speke and Grant followed, and showed almost conclusively to be the White Nile, was truly, as I said last year, a grand feat, of which all our countrymen had reason to be proud. But, in warmly praising and honouring the men who accomplished it, we are not yet satisfied, as geographers, with this their single line of march, and the valuable data which they fixed. We look naturally to other efforts which must be made to dispel scepticism regarding the upper waters of the Nile, including that raised by the claim of the Venetian traveller Miani, as to his having continuously ascended a river to $2\frac{1}{2}^{\circ}$ to the s.w. of Gondokoro, the rocky banks of which he has laid upon a sketch-map, and which he contends does not flow from the Victoria Nyanza. But irrespective of such a claim, the Council of our Society have, on general grounds, come to the conclusion that the physical geography of all the region, together with the shores of the Victoria Nyanza (a lake laid down by Speke as larger than Scotland), should be further explored, and the nature and extent of the various affluents of that vast body of water determined. They further wish to see examined the region lying between the great lake Luta-Nzige, north of the Equator, and the lake Tanganyika, south of it, in order to deter-

* The most remarkable proof of the inferiority of the negro, when compared with the Asiatic, is, that whilst the latter has domesticated the elephant for ages and rendered it highly useful to man, the negro has only slaughtered the animal to obtain food or ivory.

mine if there be not there (as some geographers think possible) other sources of supply for the White Nile, coming from the region to the west of the Victoria Nyanza; and finally, that, if possible, the Upper White Nile of Speke and Grant should be traced continuously from the lake to that point, where, according to their map, it is made to join the end of the lake Luta-Nzige.

Having considered this subject, the Council has adopted my proposal, to assist in fitting out an expedition to clear away all such obscurities, by ascending the White Nile, and not, as previously, by any efforts from Zanzibar and the eastern coast of Africa. The difficulties encountered by Speke and Grant in passing through that tract, and the apparent impossibility of establishing any regular traffic between the east coast and the central kingdoms, have induced us to prefer to any other line of research an effort to render the Great White Nile a channel of intercourse and commerce between the prolific interior and the traders of the Mediterranean Sea. One serious difficulty only exists in bringing about this desirable consummation. Between Khartûm, the present southern boundary of Egypt, and Gondokoro no obstacle on the river-navigation exists, as recently proved, indeed, by the voyage of the enterprising and intelligent Dutch ladies, though the natives in the interior have, it appears, been to a great extent demoralised by the conduct of the traders in ivory, who, arming one set of villagers against another, are said to plunder tribes, and carry away the women and children as slaves. Now, these horrible practices having been still more ruthlessly carried into effect above or south of Gondokoro, as we learn from the testimony of Speke and Grant, a belt of country, from 100 to 200 miles in breadth, inhabited by the Bari, has been rendered so lawless and savage, that it was with the utmost difficulty our medallists traversed it in their way northwards from the fertile kingdoms of Karagwe, Uganda, and Unyoro.

On the part of the Society, therefore, the Council have drawn up a memorandum, in which, after enumerating the desiderata, commercial, philanthropical, and geographical, involved in our project, we express the hope, that, as we are ready to embark 1000*l.* in such an expedition, some means may be found to put a stop to this demoralising trade in slaves, which, as our Consul-General in Cairo, Mr. Colquhoun, writes to me, is accompanied by horrors of which no one can form an idea. We believe that this can best be accomplished by the exertions of the Pasha of Egypt, and by the extension of his influence southwards from Khartûm to Gondokoro. The in-

intermediate country is a sort of No-man's-land, in which numerous warring small tribes are kept in an excited and barbarous state by an extensive importation of firearms. Now, if the miserable natives were rescued from disorders occasioned by such enormities, legitimate commerce would eventually arise between the Equatorial kings and the merchants of Cairo and the Mediterranean; and the Great Nile, which for thousands of years has alone served to enrich the soil of Lower Egypt, would eventually become a highway of intercourse with Europe, which might largely tend to the civilisation of Central Africa. To have made the first proposal in a matter of such permanent interest will, I trust, be always counted a proof of the lofty as well as useful efforts of this Society, to bring about a state of things which will prove the real importance of the discovery recently made in Inner Africa by British geographers, and may render the White Nile, for the first time in history, of real use to commerce and civilisation.

The practical geographer will, I trust, find in the observations made by Mr. Petherick and his associate, Dr. Murie, which have at length reached the Society, some materials for the construction of improved maps of the large region on that portion of the west bank of the White Nile which is watered by the Bahr-el-Ghazal. We are also indebted to Mr. Petherick for a measurement of the comparative volume of water discharged by the Nile and its affluents, the Bahr el Ghazal and the Sobat. When measurements such as these shall have been repeated at different periods of the year, we shall be in a far better position to estimate the relative importance of the tributaries and parent stream of the Nile.

In the commencement of this Session I adverted to a feeling letter written to me by Mrs. Petherick, the wife of the traveller, and explaining how he had been cast down by misfortunes and severe illness, and was unable then to send home the accounts of his expedition. These documents having arrived, will soon be printed and circulated among the Fellows, who, seeing the amount of work accomplished by Mr. Petherick, will be able to estimate to what extent the disasters he encountered prevented his fulfilling the engagements he had entered into with the view of succouring Speke and Grant.

We now wait with deep anxiety for accounts of the ultimate issue of the journey made by the adventurous Dutch ladies and their scientific companion Baron von Heuglin, and their exploration

of the great western affluents of the White Nile.* We are also equally anxious to have some account of the travels of that undaunted, generous, and self-sacrificing explorer, Mr. Samuel Baker, of whom we have heard no tidings for a year.

Conclusion.—In terminating these observations on the results of geographical explorations in various countries, I must, on the grand subject of African geography, as on the previous occasion, decline to enter upon an analysis of the respective writings, of great value in critical geography, which have in past years been contributed by our own countrymen, by continental writers, as well as by the Portuguese authorities who preceded them. An analytical sketch, which would do justice to the scholars who have from time to time set forth the results of their researches, is much wanted. In this way, for example, we might trace the amount and increase of information published by Cooley, first anonymously, in articles of the 'Edinburgh Review,' commencing in 1835, and followed up by him in the construction of a map delineating his view of a line of lakes and rivers proceeding from N.N.W. to S.S.E. through Southern Africa.

In like manner I have not, in anything I said last year, done the justice I wished to our Abyssinian Medallist, Dr. Beke, for his ingenious suggestion as to the region wherein the head-waters of the Nile would be found, and his bold hypothesis, of 1848, respecting the mountain-chains of Africa, which opened out an original view of the physical geography of Africa north of the Equator. The analyses of such subjects as these, and of all the labours of Macqueen, Arrow-smith, Petermann,† and other practical geographers, require much more time and power of research than I possess. Unable to cope with them myself, I hoped that, in taking leave of you at this Anniversary, I might be succeeded by one whose scholarship and powers as a comparative geographer would enable him to describe the

* Since this Address was read, I learn with deep sorrow that Madame Tiuné and two of her European attendants have died. Her enterprising daughter, Baron von Heuglin, and Baron D'Ablaing, had, however, reached Khartûm. As Baron von Heuglin is in regular correspondence with M. Petermann, we may look to the 'Mittheilungen' of our correspondent for much interesting matter respecting the exploration of the region of the Bahr-el-Ghazal. In a letter to Capt. Speke, which I have read, Baron von Heuglin speaks of the ivory and slave dealing merchants, and, in addition to much important knowledge respecting the fauna and flora of the Bahr-el-Ghazal, informs us that he has prepared a map of that region, as also of the country of Nyam Nyam.

† The various researches of late years in Africa are admirably illustrated by the series of maps and accompanying descriptions in the 'Mittheilungen' of Petermann, of which I gave an account in my last year's Address, and which have since been completed.

successive steps made by all contributors to our science, and, by a comparison of their labours with those of their predecessors, to trace down throughout the long current of ages the additions which have been made, in Asiatic as well as African geography, by various men, to that vast emporium of geographical knowledge which we now enjoy.

As on this head, doubtless, there have been many omissions on my part, I beseech my friends to be assured that such omissions have not been caused by any want of good will, but simply from an inability to do justice to the theme amidst the many other avocations which occupy my time.*

One task, however, I will try to accomplish, to the best of my ability, if my tenure of life be prolonged, and that you should place me for the current year in this Chair. I will endeavour at our next Anniversary to draw a parallel between the general state of geography when this Society was founded, in 1830, and the condition which it has reached in the present day; and, in doing this, I hope to demonstrate that my countrymen have borne no small share in this progress, and that the Royal Geographical Society has taken the lead in efficiently promoting this great work of advancement,—not merely by the publication of the volumes of our Journal and our Proceedings, but by zealously encouraging explorations, and by rewarding those persons, to whatever nation they belonged, who have thrown light on the geography of the world.

P.S.—Whilst this Address is going through the press, letters from Dr. Livingstone have reached me, giving an account of his journey into the interior, on the west bank of the Shiré, and for nearly 700 English miles to the N.W. of that river. Owing to his being obliged to return to settle the affairs of his Consulate and to convey H.M. *Pioneer* steamer down the Zambesi, he was unable personally to determine the question whether any waters flow into the head of the great Lake Nyassa (coming, as had been suggested, from Lake Tanganyika).† The natives, however, one and all, denied that any waters entered the lake from the north, and Livingstone seems

* Some of the discussions which have been going on between Mr. Cooley and Capt. Burton, and others, can only be correctly understood by etymologists who have studied the African languages and dialects.

† As far as it was examined and laid down on a map by Dr. Kirk, the Lake Nyassa trends due South and North.

to think that the lateral affluents which he saw are sufficient to account for the infilling of the lake and the supply of the Shiré.

The one point on which Livingstone and all African travellers are agreed is, that where no traders in slaves and ivory are met with, there no difficulty occurs in passing through the country; the inhabitants willingly serving as porters. In a recent letter to Captain Speke, which I have already mentioned, Baron von Heuglin, after affirming that the ivory dealers in the Bahr-el-Ghazal are barbarising all that fine region, and have rendered it impassable, exclaims that it is a disgrace to civilised governments not to endeavour to put an end to these horrors. Let us hope that the aspirations of our Council, in unison with the prayers of all travellers, may have a due influence on the governments of Europe and Egypt, and thus eventually render the White Nile useful as a highway of commerce.

June 10th, 1864.

PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED 1ST OCTOBER, 1864.]

SESSION 1863-4.

Thirteenth Meeting, June 13th, 1864.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Edward Webster, Esq.; Charles H. Allen, Esq.; Thomas Ogilvy, Esq.; Edward Warner, Esq., M.P.; Lord Belmore; E. C. Lowndes, Esq.; F. F. Joyes, Esq.; G. Gladstone, Esq.*

ELECTIONS.—*Edward Bellamy, Esq.; William Field Ives, Esq.; Alexander Mackinnon, Jun., Esq.; Edward O'Riley, Esq., F.R.S.; Captain Henry Toynbee.*

ACCESSIONS TO LIBRARY.—‘*Explorations in Australia,*’ by J. McDouall Stuart; edited by William Hardman, M.A.; 3 copies presented by Messrs. Saunders and Otley. ‘*Bulletin de la Société d'Encouragement pour l'Industrie Nationale,*’ Mars, 1864. Continuations of Transactions of various Societies, &c.

ACCESSIONS TO MAP-ROOM.—Photograph of the North Atlantic Telegraph Expedition, 1860.—Vale of Brallilid, South Greenland.—Government Maps of the Kingdom of Denmark; 55-inch; complete up to date of presentation.—Seat of War in America, near Richmond (2nd edition), from the Topographical Dépôt.—Continuation of the Ordnance Maps and Admiralty Charts.

The first Paper read was—

1. *On the Travels of Portuguese and others in Inner Africa.*
By W. D. COOLEY.

THE object of the Paper was to propound the views of the author, formed on a careful examination and comparison of the reports of various travellers, on the position of the rivers, lakes, and places

in Inner Southern Africa. The accounts of several Portuguese travellers were passed in review; and the author contended that their itineraries were so full and their various accounts so accordant, that, notwithstanding the paucity of their astronomical observations, the geographical information they imparted was quite reliable, and ought not to be set aside, as had been done in the construction of modern maps. The subject was argued with much learning, and a large map was exhibited to illustrate the views of the author. Some of the more striking points of difference between this map and the recent ones of Livingstone were the total separation of the rivers Liambeji and Zambesi (the upper and lower courses of the Zambesi) and the release of their affluents from the system of inosculation which, in recent maps, bind all those rivers together; and the north-west direction of Lake Nyassa, which was made continuous with Tanganyika, forming an elongated lake, called *Nanja mucúro*.

The PRESIDENT said, Mr. Cooley was who had spent his life in elaborating from Portuguese travellers who have preceded c The present paper had been so recently: time to read it through; but, finding that the observations were of a critical nature, and that they bore to a great extent upon the accuracy of Dr. Livingstone's observations, he thought it right that the criticisms should be read first, and that Dr. Livingstone's simple account of his last exploration along Lake Nyassa, which he had undertaken of his own accord, should come afterwards; and then, that gentlemen who were more or less acquainted with the country should discuss the papers afterwards. He wished the subject to be fairly discussed, and that all deference should be shown to Mr. Cooley's powers as a critical geographer, for he was sure the Society desired to do justice to every man, whatever his labours might be, whether in critical geography or in actual observation.

Mr. MARKHAM then read the following :—

2. *Letters from the Zambesi to Sir R. I. Murchison, and (the late) Admiral Washington.* By DAVID LIVINGSTONE, M.D., LL.D.

THESE letters comprised a narrative of Dr. Livingstone's last journey into the interior. The despatch containing instructions for the withdrawal of his expedition did not reach him until the 2nd of July, 1863, when the waters of the Zambesi had fallen too low for the *Pioneer* to be taken down to the sea. To improve the time, therefore, until the flood of December, Dr. Livingstone set forth, accompanied by the steward of the vessel, to finish the exploration of Lake Nyassa, and more particularly to decide whether a large river entered its northern extremity. The wreck of his boat in the rapids of the Shiré forced him to abandon the attempt to sail round

the lake; he therefore started to go to the northern end by land, pursuing for many days a north-westerly course so as to avoid a colony of Zulus, who were at war with the negroes on the western shores of Nyassa. In this direction he came upon a range of mountains, 6000 feet high, running north and south, and forming the edge of the table-land on which the Maravi dwell. Beyond this he turned to the north-east, and struck the shores of the lake at Kota-kota Bay in lat. $12^{\circ} 55' \text{ s.}$ He here found two Arab traders engaged in building a dhow, to replace one which had been wrecked in crossing the lake. This is the point at which nearly all the traders in slaves and ivory cross on the highway between the eastern sea-ports and the Cazembe country of the interior. The Arabs had 1500 persons in the village, and were busily employed transporting slaves to the coast. One fathom of calico (value 1s.) is the price paid for a boy, and two for a good-looking girl. But, nevertheless, it is the joint ivory and slave trade that alone makes slave-trading a paying business; for the cost of feeding the negroes would be too great an expense were it not for the value of their services in carrying the ivory; a trader with twenty slaves must daily pay the price of one slave for their sustenance. All the difficulties which Dr. Livingstone had experienced in travelling in the interior were due to the obstacles thrown in his way by the Portuguese, who judged truly that in buying up the ivory he was undermining the slave-trade. He only hoped that this same course would be pursued by other travellers who might succeed him, as this did more to destroy the slave-trade than the English cruisers on the coast. Leaving Kota-kota Bay, Dr. Livingstone again turned due west, and in three days reached the ascent of the plateau. The long slope, adorned with hill and dale and running streams, fringed with evergreen trees, was most beautiful. The heights had a delicious, but peculiarly piercing air, which was very exhilarating. At this point, distant 80 or 90 miles from Nyassa, the watershed was crossed, and two rivers met with, both named Loangwa: one was found flowing eastward, into the lake; the other westward, towards the Zambesi. Another river was here seen, called the Moitawa, which flows into a small lake, called Bemba; from this river issues, according to native and Arab report, the River Luapula, which, flowing west, forms the Lake Mofue, and then, passing the town of Cazembe, turns to the north, and is lost in Tanganyika. Dr. Livingstone had a strong desire to follow the stream, but the time for the rising of the Zambesi and for floating the *Pioneer* out to sea having arrived, he was obliged to return. With regard to the existence of a large river flowing into the northern end of Nyassa from Tanganyika, Dr.

Livingstone was assured by all the natives of whom he inquired that there was no such stream, but that two small rivers alone enter the lake from the north. The numerous streams met with on this journey flowing from the west into Nyassa seemed to warrant the conclusion that no flow of water from Tanganyika was necessary to account for the great depth of the lake and the perennial flow of the Shiré. In this journey Dr. Livingstone and his companion walked 660 miles in 55 travelling days. On arriving at the Zambesi he found the river had not yet risen, the rains being much later than usual, and was mortified in the reflection that had he dared to speculate on a late rise he would have had ample time to examine the water-system of Lake Bemba.

The PRESIDENT was sure they would all agree with him that Dr. Livingstone had made the best possible use of his time as a geographer in this exploration to the north-west of Lake Nyassa, of which he had previously explored the western banks in company with Dr. Kirk. The observations of Mr. Cooley seemed to have no special reference to this communication respecting the outlines of Lake Nyassa and the mountains to the west and north-west of it. The map constructed by Dr. Kirk shows Lake Nyassa stretching directly north and south, a distance computed at 200 miles; but on Mr. Cooley's map the lake is made to trend to the north-west. There was, therefore, this great discrepancy between the observations of the Portuguese who visited that country many years ago, and the *de facto* recent observations of Dr. Livingstone and Dr. Kirk.

Captain SPEKE said he had a few remarks to make upon both papers. In the first place, Mr. Cooley, taking the Portuguese accounts, made a continuous lake of the Nyassa and Tanganyika. He himself was inclined to believe that at one period there really was such a union; and he thought there was still a connection between them, though not as a broad lake. When he was at Kazé he heard from the Arabs, and also from many of the natives, that the Babiza tribe, which inhabit the western shore of the Nyassa lake, cross a deep river by canoes, and find their ivory mart at a place called Luwemba, not far distant from the south-east corner of the Tanganyika. To this place the Arabs from Kazé, and their slaves, go for ivory. Thus whilst the Arabs draw their ivory up to Kazé, the Babiza take theirs down the western coast of Nyassa to Kotakota, where they sell it to Arabs, and from that point it is transported to Zanzibar by Kilua. All these trading people at Kazé told him that there is no mountain-range dividing the Nyassa lake from the Tanganyika lake; but they all talked of a river running as it were from one lake into the other, from which he inferred that the Tanganyika was drained by a river into the Nyassa. Dr. Kirk had assured him that no large river entered the Nyassa at its northern end. He should like to know from Dr. Kirk whether he derived his information from Arabs or from his own personal inspection. The river system of Africa is chiefly determined by the rainy system of that continent. Within the Tropics everything goes on in an exact ratio throughout the year, the rains following the path of the sun. The greatest rains are confined to the Equatorial line—the part to which the sun is nearest, on an average, the whole year round. Were it not for that rainy zone, the sources of the Nile would certainly not be on the Equator. The Tanganyika would not be in existence; nor, as he believed, the Nyassa either. Whilst the sun is in the north, the Nyassa lake, were it not supplied by the rains which are constantly falling on the Equator, would dry up, in the same manner that Lake Tchad dries up; that is to say, to a certain extent.

Again, with regard to Lake Dembea, in Abyssinia, we know what an enormous river this lake pours out when the sun is to the northward, and how it shrinks when the sun is to the southward. The size of that river is so prodigious in the rainy season that it overcomes the White Nile. But in the dry season, if it were not for the White Nile, the waters of that river would never reach Egypt, and there would be no Nile at all. The greatest possible importance must, therefore, be given to this system of rains, and he firmly believed that the existence of the Nyassa lake is due to the rains of the Equatorial regions. Upon reference to the map, they would see that the majority of the streams which flow from the mountain-range overhanging the west of Nyassa, turn off to the westward, and, as Dr. Livingstone imagines, drain into the upper course of the Zambesi river. So that but little water could possibly find its way into Lake Nyassa in that direction. On the eastern side of Nyassa we have the Ruvuma river draining all the countries to the east of it, in that latitude; and to the northward of that we have the Urunga branch of the Lufji river. Then, there is that great chain of mountains which extends right down the coast of Africa from Abyssinia to the Cape of Good Hope, hemming the lake in on its eastern side. So that really the rains that can fall within the basin of the Nyassa are so confined that there would never be a lake of such enormous depth as that of which we have just heard, were it not supplied from much greater sources than these puny streams of which Dr. Livingstone tells us; for such they must really be, having their sources at so short a distance from the shores of the lake. Notwithstanding all that had just been said, he thought Mr. Cooley to a certain extent right in the view he had taken, that there is a long channel extending from the Tanganyika to the Nyassa, though instead of its being a continuous lake as of old the waters have dried up to midway, leaving the two lakes simply connected by a river. There was another thing which may appear extraordinary. They had heard from Dr. Livingstone that there were Zulu Caffres on the western shore of the Nyassa. Dr. Kirk also saw these men and spoke with them, and recognised them. From their dress and other circumstances he was certain that these very men, who have absconded from that region, have now gone up the eastern side of the Tanganyika, and have arrived at the southern border of the Usui, where they are known by the name of Watuta; for he heard of them on both journeys, when on the grand trading-line from Zanzibar to Tanganyika, and also when going from Kazé to Karagué. On this latter journey they were fighting on his line of march, had struck terror into the hearts of his followers, and had thereby delayed his progress a considerable time. He believed the Caffres generally migrated in the first instance from Abyssinia; that they gradually found their way down to the Cape, and there remained for a certain time until they were driven away; that then, this Zulu branch of the Caffres made their way to the western shore of Nyassa. They are a pastoral and predatory race, and live by seizing their neighbours' cattle, and harassing their country. They have harassed the whole of this country to the north-west of Nyassa; they have harassed the country half way up the Tanganyika; and they have gone up to Utambara. They are now the terror of the Usui; and before long they will probably arrive at the southern shores of the Victoria Nyanza. There was another point he should like to mention. On his former journey, when he was at Zanzibar, he met a very intelligent and energetic young German, Dr. Rosher, who had been very little heard of in this country. He believed Dr. Rosher was the first European who arrived upon the eastern shores of the Nyassa. After arriving at the lake he was, unfortunately for himself, induced, accompanied by two or three natives, to visit the northern branch of the Ruvuma river. One night, having put up at a village, he was suddenly surprised and deliberately shot with bows and arrows. The King of the country sent the murderers to Zanzibar, where, at the solicitation of our consul, Colonel Rigby,

they were beheaded by the orders of the Sultan of Zanzibar, in the presence of Captain Grant. Dr. Rosher sent home no observations of what he had done; but nevertheless, like Sir John Franklin in another direction, he had done a good work, and must not be forgotten. But further inquiry, and even Dr. Livingstone's own accounts, showed that the first promoters of the explorations into that region of Africa were right; he meant the missionaries, Mr. Rebmann and Mr. Erhardt. They gave the spring to the whole opening of this question; and the map which they made, which was certainly an extraordinary one, and which probably excited laughter at the time, had such an effect upon the Geographical Society that they determined to open up this region; and bit by bit they had done so. We have found out that the missionaries, generally speaking, were most accurate in all their accounts, so far, at least, as they understood their informants. Their distance from Kilua to the Nyassa is perfectly accurate, and their route from Zanzibar direct to Ujiji was almost the same that he himself made with astronomical observations. Therefore he thought geographers were greatly indebted to these two worthy missionaries.

Mr. GALTON did not agree with Captain Spoke as to the equatorial regions of Africa alone having a sufficient rainfall to enable them to maintain rivers of first-class size. The Senegal, which rises on the verge of the Sahara, is a first-class river, as constant in volume throughout the year as the White Nile. The Gambia is no insignificant stream; and, further south, there is the mighty Niger. None of these is supplied from the equatorial zone. Independently of its Tchadda affluent, the Niger, which may be said to flow in part through the Sahara, is a stream superior, in the volume of water it carries, to the Upper White Nile, which comes from equatorial regions. South of the equatorial zone there is the great Zambesi. With respect to lakes, the Lake Tchad never dries up. It occupies an exceedingly shallow basin; and by losing a few feet of water in height its area materially diminishes; still at the driest time of the year there is an immense deal of water in Lake Tchad. Therefore he saw no difficulty for the maintenance of Lake Tanganyika and Lake Nyassa by tropical, and not equatorial rains. The outflow of Lake Nyassa through the river Shiré was, however, remarkably constant, and that constancy created a hygrometrical difficulty, which requires further explanation.

The PRESIDENT said he would now call upon the only person in the room who had sailed upon Lake Nyassa, and had been near its northernmost extremity, about which there had been so much discussion as to whether or no rivers flowed into it from the north. As that was the great point in dispute, and as Dr. Kirk had constructed the map of the lake now exhibited, the meeting would doubtless be pleased to hear any observations he might offer.

Dr. KIRK said he should limit his remarks to the hydrographic basin of the Nyassa, and afterwards say a few words about the Zambesi. Tracing Lake Nyassa from its southern end, in latitude $14^{\circ} 25'$, where they entered it by taking the boat up the Shiré, in 1861, they passed along its western shore for 200 miles, nearly south and north. The water was as blue as the tropical ocean, and in some places 115 fathoms deep. In sailing along its western coast they found seven rivers entering, seen from the boat. But in recent letters from Dr. Livingstone many other rivers were mentioned as coming in, and he expressly said that the amount of water thus brought in would be quite enough to account for the perennial flow of the Shiré. During the rains there must be a great excess in the water flowing into the lake over what flowed out of it. When they considered the extent of the lake, 200 miles in length, and its breadth from 15 to 60 miles, and knew that there was a rise of three feet during the rains, this would amply account for the surplus water then poured in. Considerable importance appeared to be attached to the north end. That part of the lake had not been seen by any of their party. The furthest point north

reached by the boat in 1861 was latitude $11^{\circ} 20''$. They could then see mountains ranging along on the western side as far as latitude $10^{\circ} 55'$; they could also see the bearings of a mountain on the eastern side, named Kumara, a name which, in the native language, means "the ending." He did not, however, attach much importance to native names; they are established often on very frivolous bases. However, it was clear that the lake was narrowing, from 60 miles, which was its breadth a little way south, to 15 miles. The natives told them that in five days' sail (and they named the stations and the intermediate places on the north end of the lake) they would double it, and would reach a point on the eastern shore opposite to where they then were. This information seemed very definite, and all the party placed reliance upon it. As to a river coming in from the north, the only ones they heard of were two small ones, one named in a generic way the Rovu, which means simply "river," and the other which they described as a small river coming in from a marsh. Whether this has any connection with the Tanganyika, he was not prepared to say; but it would seem to have very little to do with the supply for the Nyassa. It cannot be of any great size, for the Zulus, passing up the east side of the Shiré, and taking off the cattle from the east side of the lake, doubled its north end; and the Livingstone party saw them, still with their cattle, on the north-west side. Now, the Zulus are a race who never cross water if they can possibly avoid it; and he did not see how they could have crossed a lake with the considerable quantity of cattle which they took with them. The amount of rain which falls in the region of the Nyassa is very much larger than is generally supposed. Even on the Zambesi, as far south as Tete, the rainfall varies from thirty to forty inches in the year. Along the coast-range of hills the precipitation is very much greater. There is a narrow and lofty band of mountains which separates the Nyassa from the sea; and the inland side of that range is the one on which the greatest precipitation takes place. In the diagram prepared by Mr. Cooley they would observe that the course given to the lake is very different from that which he and Dr. Livingstone found, and that no river was marked as issuing from its southern end. Now, they found the Shiré coming out there. They took the boat up first through the Zambesi; branching off from that at the junction with the Shiré, they passed 100 miles up that tributary. Then, taking advantage of the smooth reaches, they traveled 40 miles by land, taking the boat along with them, but never for a moment losing sight of the Shiré; launching the boat again, they sailed 60 miles into the lake which the Shiré enters without obstruction. They found the lake lying due north and south, both by compass bearings and by absolute observations of longitude.

There was a discrepancy in another part of Mr. Cooley's map, at a point where he had the opportunity of making personal observations, namely, the portion between the upper and lower course of the Zambesi, which is marked unknown in the map, and the lower course is treated as a quite distinct river. Now, he had, by his own observations, almost connected the lower with the upper Zambesi. In marching from Tete their party followed the river on foot as far as a village called Mpana. From that point they struck up into the mountains, and crossed to Ssheke. But in coming back from where the Makololo chief was then living, they descended from the Victoria Falls eight miles down the Zambesi by land; then, to avoid rough mountains, and save themselves a great deal of climbing, they determined to keep out about 10 miles from the river, thus leaving in all only about 30 miles of the Zambesi unexplored. At Sinamane, which is 40 miles from the Victoria Falls, taking a canoe, they navigated the whole course of the Zambesi, passing its affluents, the Kafue and the Loangwa, at Zumo; but finding the rapids of Kebrabassa insuperable, they again went on land, and followed the Zambesi down to Tete. He therefore thought that, so far, the continuity of the Zambesi was pretty well

determined. Again, on the south bank the course of the river appears equally well traced. In a letter to Sir William Hooker, Mr. Thomas Baines mentions having started from Victoria Falls, and passing a little out from the river, in order to avoid rough country, again having struck the river about 10 miles further down. So that the unknown part of the river and country is limited to a radius of 20 miles at the utmost.

In conclusion, with regard to Lake Nyassa, he would state that the native information was tolerably definite concerning rivers entering the lake on the north-west. Their party met Arabs, the same as : : : : in Dr. Livingstone's letter as building the dhow. They had travelled along that country from Katanga and Cazembe, the two great marts of the interior. They spoke of the Loapula, running to the northward into a small lake; but on being examined, it appeared to have no connection with the Tanganyika; and when asked about the small rivers coming in at the north end, they assured Dr. Livingstone that they were of no great size. The more recent information which Dr. Livingstone had gathered seemed entirely to confirm what was obtained in 1861.

Dr. BEKE wished to say a few words with reference to the supposed connexion between the two lakes, which he had questioned since 1849, though he had not cared to argue the point with Mr. Cooley.* According to Captains Burton and Speke, Lake Tanganyika lies 1844 feet above the ocean. Dr. Livingstone estimated Lake Shirwa at 2000 feet. He has not yet given the altitude of the Nyassa; but several years ago he reported that its waters had been described as being separated from those of the Shirwa by a mere spit of land: whence it was concluded that a communication of some sort must exist between these two lakes.† Assuming this to be the case, and the fact being also that, between Nyassa and Tanganyika, Dr. Livingstone has recently come upon a range of mountains, 6000 feet high, running north and south, and forming the edge of the tableland—being, apparently, a continuation of the Mountains of the Moon—it follows that a connexion between Nyassa and Tanganyika is physically impossible. Captain Speke had described the flow of water from the Lake of Dembea (Tsana) as being so immense that it exceeded that of the White River. But this lake could not furnish to the Nile more water than falls within the area of its basin, which forms but a small portion of that of the Blue River. All the water which issues from Lake Tsana passes under a single-arch bridge built by the Portuguese; and, as is stated in the Society's 'Journal' (vol. xiv. p. 48), when describing Dr. Beke's visit to the spot, on March 4th, 1843, "the river runs here with great violence through a deep fissure in the rock, so narrow that just above the bridge it may be leaped over. I should say it cannot be more than 2 yards in width." Father Jerome Lobo relates that in his time, before the bridge was erected, the whole army of the Emperor of Abyssinia passed over the chasm containing the river by means of beams of wood laid across it.

Mr. MACQUEEN said that on Mr. Cooley's map the places, according to Portuguese observations, especially the capital of Cazembe, were placed wrong. As for the lake which Dr. Kirk has laid down, it is quite correct; it has been known for more than two hundred years to lie in the very direction in which he has put it. There can be no connexion between the Nyassa and the Tanganyika—it is impossible; the country between Tete and Cazembe has been

[* See the 'Athenæum' of May 19th, 184, p. 516, and July 12th, 1856, p. 867.—Dr. B.]

[† See Earl De Grey's Anniversary Address, 1860, in the Society's 'Journal,' vol. xxx. p. clxi. I have since been informed by Dr. Kirk that he makes the elevation of Lake Nyassa to be only 152 feet above the sea; but this does not affect my conclusion.—July 5th, 1864.—D. B.]

traversed many times of late years, and nobody ever heard of a connexion between them. In the old Portuguese maps (see 'Annaes Maritimas,' No. 7, of 1844) the Lake Nyassa is laid down very nearly correct, both in latitude and longitude. He had worked at African subjects for sixty years, and he had been in possession of the Portuguese documents for nearly twenty years. There was a very valuable Arabic map that Admiral Washington showed to him twenty-five years ago, which he would ask the Society to make some inquiry about. It was one of the best maps he ever met with, well executed by a man who perfectly well knew what he was about, giving an account of the sources of the Congo, and all those rivers which run westward from Darfur. It was a very valuable map, and he had never seen it since.

The PRESIDENT said Mr. Macqueen's observations were very important. For sixty years he had laboured upon this subject. He has been a great collector of Portuguese authorities, and he must say that he had great confidence in Mr. Macqueen as a critical geographer. Now, Mr. Macqueen stated that the Portuguese had laid down their map of Lake Nyassa just as Dr. Livingstone and Dr. Kirk have laid it down.

MR. MACQUEEN: Exactly so. In 1623 you find the southern or small lake laid down in the very latitude and longitude where Dr. Livingstone has laid it down. Thus, Father Godinho, in 1823, obtained from a countryman of his clear accounts of this part of Africa. The small lake he called Zechaf extended from 15° south latitude to 15° 50' south latitude. Again Monteiro and Gamitto (see their Journal, 1832, Muata and Cazembe, p. 48), say the south end of the great lake was 6 days' journey north from the small one, and was of "extraordinary breadth," 45 geographical miles, and very deep. Dr. Livingstone says it is about 50 miles broad at its south end. Monteiro calls it Nhianja or Nhianza (so does Lacerda in 1798), and that it runs a great distance due north. And so we find it.

The PRESIDENT was afraid this knotty question would never be completely decided until they had induced Captain Speke or some other traveller to go and do as Dr. Livingstone and Dr. Kirk had done with Lake Nyassa. When gentlemen go into such countries, risking their lives to search out the truth and making astronomical observations which fix latitudes and longitudes, it is obvious that all preceding accounts, derived from Portuguese and Arab travellers who did not make such observations, must give way to facts. Therefore, let us return our thanks to Dr. Livingstone and Dr. Kirk for their practical observations, and also to Mr. Cooley for his paper, which has given rise to so animated a discussion.

Portions of letters were then read from Dr. Baikie, Baron Theodor von Heuglin, and M. du Chaillu.

3. *Letter from Dr. Baikie.* Dated Lukoja, on the Niger, October, 1863.

EXTRACTS read from this letter showed how successful Dr. Baikie has been in establishing satisfactory intercourse with all the native chiefs around the settlement which he has formed on the Niger. He expresses feelingly his desire to return home, to see his aged father, from whom he has been absent seven years; but nevertheless remains at his post.

The PRESIDENT eulogised the conduct of Dr. Baikie, and expressed a hope that, as the officer serving under him had proved himself competent to

carry on the same successful system, Her Majesty's Foreign Secretary would take the case into his favourable consideration.*

4. *Letter from the Baron von Heuglin to Captain Speke.* Dated Bongo (between the Rivers Djour and Kosanga), October, 1863.

AFTER recording the death of Madame Tinné and her maids, and the return of the party, Herr von Heuglin states that he is resolved, after visiting Khartûm, to try to advance further towards the south-west; but he doubts whether he shall be enabled to penetrate so far as the Rivers Sena and Makoua, which it had been his wish to do. There are many obstacles, not proceeding however from the natives, but from the merchants and slave-dealers of Khartûm, who are jealous lest travellers should learn too much of the secrets of their trade, and so prohibit the poor negroes from rendering them service or selling them provisions. The warehouses of the traders are filled with grain and other stores extorted from the natives, whilst the latter are suffering from famine. In the course of his researches on the banks of the Kosanga, he had discovered many isolated mountains, and one rather considerable range lying to the west and north-west in the country of the Quola. These elevations, he believed, were formed (contrary to his earlier opinion) of primary rocks, for he had found fragments of granite in the beds of the torrents with which the clayey soil was furrowed. The flora and the fauna differ much from those of the White Nile, and approximate those of Guinea. The negro type ceases with the Djour tribe; the Fertits, Kredjs, Quolas, and Nyam-nyams being robust, well-made people; their hair is not curly, and their shape and physiognomy are similar to those of the Baquára tribes and the inhabitants of Senaar. The same affinities are observable in the languages. If it were possible to reach the Nyam-nyam country, travelling would be more easy, as the chiefs are well-disposed towards Europeans, and would facilitate their progress if presented with arms, powder, cloth, and so forth. He adds that he has traced a tolerably correct map of the Bahr-el-Ghazal, and determined a few points by astronomical observation. In conclusion, he hopes that the English Government will take some measures towards suppressing the slave-trade, which is now in full vigour on the

* Mr. Layard has since written to Sir Roderick Murchison as follows:—

"June 26, 1864.

"Dr. Baikie has been relieved. The *Investigator* steamer will be sent to bring him down the Niger, and he may be expected home this year. I hope that satisfactory arrangements will be made to render the work he has done permanently useful."

White Nile, nearly all the vessels and trading-stations taking part in it.

5. *Letter from M. Du Chaillu.* (Fernand-Vaz River, April 7, 1864.)

M. DU CHAILLU now announces that all will be ready for his projected journey into the interior, as soon as the new set of scientific instruments reaches him, sent for to replace that lost by the upsetting of his boat. He is in good health, and intends to send by the next ship to England all the collections he has made up to the present time.

Fourteenth Meeting, 27th June, 1864.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Gavin Hardie, Esq.*; *Captain Toinbee*; *W. F. Ives, Esq.*; *D. G. Bruce-Gardyne, Esq.*; *J. S. Phene, Esq.*

ELECTIONS.—*Commander A. L. Mansell, R.N.*; *H. N. Nissen, Esq.*; *W. F. Quicke, Esq.*; *Charles M. T. Western, Esq.*; *George Woolcott, Esq.*

ACCESSIONS TO THE LIBRARY.—Pamphlet on the Hooghly and the Mutla; by James A. Longridge, M.I.C.E. Continuations of Transactions of various Societies, &c.

ACCESSIONS TO MAP-ROOM.—Railways in China: a sketch-map to accompany Report on introducing Railway communication into the Empire of China; by Sir Macdonald Stephenson, 1864. Admiralty Charts and Ordnance Maps. Originalkarte von Hamasen, Saraë, Adiabo, &c., in Nord Abessinien; von Th. von Heuglin, Werner Munzinger und d'Abbadie; entworfen von A. Petermann. Originalkarte der Nord Abessinischen Grenzlande; Bogos, Mensa, Marea, &c.; von Heuglin, Kinzelbach, &c.; entworfen von A. Petermann.

The first Paper, read by Mr. Markham, was entitled—

1. *A Visit to the Port of Lingah, the Island of Kishm, and the Port of Bunder Abbass.* By Lieut.-Colonel LEWIS PELLY, Acting Political Resident in the Persian Gulf.

[Communicated by the Secretary to the Government of Bombay.]

COLONEL PELLY left Bushire in December, 1863, and touched first at the port of Lingah, on the mainland, which he describes as an

open roadstead, sheltered from the north-west, but exposed to the prevailing south-east and south-west winds. There is, however, a breakwater of solid masonry which affords protection to small craft. The town is the chief place of a district which touches the sheikdom of Moghoo on the north-west, and reaches almost to the region farmed, under Bunder Abbass, by the Sultan of Muskat. It is un-walled, and consists of clusters of houses overhung by date-palms, its population being from 8000 to 10,000 souls. The sheikh of Lingah is an Arab of ancient descent, and the place enjoys considerable prosperity owing to there being neither import nor export duties. The bulk of the trade is with the maritime Arab ports, to which goods from Bombay and Kurrachee are conveyed in small coasting-craft; specie, pearls, and a little salt-fish forming the return cargoes. Arrived at Bassidore, in the island of Kishm, Colonel Pelly crossed to the southern side to visit some salt-caves and naphtha-springs. The road was, partly, over a plain sprinkled with date-trees and villages a few miles apart. The prevailing formation of the island is like that of the mainland hence to Kurrachee—a coarse sandstone grit and conglomerate, overlying blue lias marl. The south side is parched and barren, like the Persian coast in general. Wordsworth, according to Colonel Pelly, had he visited this region, would never have applied the epithet of “everlasting” to the southern hills of Persia. They are all hollow and tumble-down, as the towns are. Passed at night, the gloom of their gorges and the precipitous height of their flanks, lend them a bold and solemn appearance; but with daylight the illusion vanishes. The range of hills in which the salt-caves lie varies from 300 to 600 feet in height; the rock is of a dark-red aspect alternating with slate-colour. One of the caves is of truly noble proportions, being a vault of from 200 to 300 feet in height and length, with a span of 60 or 70 feet. The entire arch of the cave is beautifully streaked like marble, while large crystalline salites hang from the roof in festoons white as snow. The blocks of salt are conveyed on the backs of donkeys and camels to the sea-shore, where they are embarked in small native craft, and carried to Muskat for ultimate exportation to Calcutta and the east coast of Africa. Returning to Bassidore, Colonel Pelly again embarked, and passed down the Clarence Strait, which separates the island of Kishm from the mainland, through a narrow channel, about 100 yards wide, which winds for a distance of 21 miles between low bushy islands. Within this channel lies the village of Luft, which is sub-let by the Sultan of Muskat, who farms the whole island of Kishm, to a sheikh for about 1500 rupees per annum. The trade of the inha-

bitants is the gathering of wood for exportation, Clarence Strait supplying the whole circuit of the Persian Gulf with firewood. Colonel Pelly next visited the island and city of Ormuz, whose bygone splendour is vaunted by old writers, but whose ruins did not show signs of any former greatness. Crossing hence again to the mainland, a distance of 12 miles, he examined the neighbourhood of Bunder Abbass, a walled township built along an open beach, with lofty and desolate mountains in the background. The port has only from 2 to 3 fathoms of water at a distance of 2 miles from land, and during the frequent southerly winds becomes a lee shore lashed by a heavy surf. Bunder Abbass has about 8000 or 9000 inhabitants, and is the seat of a considerable trade, the nature of which is discussed in detail by the author of the paper.

SIR H. RAWLINSON said the island of Kishm was of some interest from having been supposed to be the site of the ancient kingdom of King Erythrus, who gave his name to the Erythraean Sea. The chief modern interest attaching to the island arose from its being in the line of the Overland Telegraph. The cable had been laid, and was in working order from the Indian Telegraph-system at Kurrachee, along the Persian coast to the entrance of the Gulf, then round the island of Kishm up to Bushire, and thence across to Bussorah. Two years ago he had explained to the Society the difficulties in the way of the line which it was then determined to follow, between Bussorah and Bagdad, and had suggested a method of avoiding the obstacle by taking the more circuitous route to the east through Persia. These anticipated difficulties had been realised at the very spot he had pointed out. That part of the line between Bussorah and Bagdad would always, under the most favourable circumstances, be precarious; whereas the alternative line which he had suggested, and which was now being carried out, would always be safe, because the country through which it passed was under a fixed Government, who would guarantee the protection of the line. He thought in the course of September or October, we might expect to be able to communicate daily with our friends in India.

The PRESIDENT in requesting the Secretary to read the next Paper, explained that its author, M. Vámbéry (who would afterwards address the Meeting) was a Hungarian gentleman, who had lately penetrated into the heart of Asia in the disguise of a Dervish. He had travelled in a region which had scarcely been traversed by a European since the days of Marco Polo. M. Vámbéry intended shortly to undertake a further journey, starting from Samarcand, and would endeavour to reach China, following a route different from that of Marco Polo.

Mr. OLIPHANT then read—

2. Sketch of a Journey through Central Asia to Khiva, Bokhara, and Samarcand. By M. VÁMBÉRY.

AFTER several years of preparation in a Mohammedan college, M. Vámbéry joined, at Teheran, in March, 1863, a company of poor pilgrims, who were returning to Tartary from Mecca; giving out that he was a pious Mussulman travelling to Central Asia with a religious object. They crossed the south-east corner of the

Caspian Sea on board a Turcoman corsair, and landed at Geumush-tepe (the *Silver Hill*), a camp of about 2000 tents of the Tamut tribe. From this place he visited the ruins of the wall built by Alexander the Great, which begins on the shores of the sea near this place, and stretches about 100 miles inland in the form of an embankment, dotted with turrets and fortifications. Continuing, with the party, in a northerly direction, eastward of the Caspian, he passed the river Attrek; and after crossing the Hyrcanian Desert, a horrible journey of 22 days, reached Khiva at the beginning of June. The present condition of the country, of which Khiva is the capital, he described as most wretched. The reigning prince, Seid Mohammed, a sick tyrant with very frightful features, does little else but slaughter hundreds of his subjects for mere trifles, which he calls transgressions of the holy religion of Mohammed. M. Vámbéry made excursions as far as Koongrad, and was astonished at the great fertility of the country, which he thought superior to anything he had hitherto seen in Asia. The next place he visited was Bokhara, distant 10 or 12 days' journey on camels from Khiva. On the road, his party, to avoid a band of Turcoman robbers, were obliged to seek refuge in the desert of Djan-batiran (the *Life-destroyer*), where for six days they suffered horribly from thirst, and lost two of their number. The city of Bokhara occupies more ground than Teheran, but it is not so populous. Some of the palaces and mosques are built of stone, but the large, clumsy turrets produce a disagreeable impression. The whole khanat of Bokhara he estimated to comprise two million souls, including Persian slaves. The reigning prince is Moozaffar-ed-din, son of the Khan who murdered Conolly and Stoddart. He is a man of a good disposition, but is forced, for political reasons, to commit many tyrannical and barbarous acts. After spending a month in Bokhara, M. Vámbéry proceeded, full of anticipation, to the renowned city of Samarcand. He travelled for six days through a thickly-peopled and well-cultivated country, and was greatly surprised at the quick succession of towns and villages on the road. But in Samarcand he was much disappointed. He found the capital of Timour in a state of decay; and although he saw a few remains of its ancient glory, was convinced that the ancient reputation of the place was greatly exaggerated. The most remarkable of the ancient edifices were the medresses or colleges, one of which, erected by the wife of Timour, a Chinese princess, was a most splendid building; but the magnificent portico, 100 feet high, inlaid with mosaic in the form of roses, is now all that remains of it. The palace of Timour he described as very interesting, especially his tomb, and a huge block of green-

stone, the base of his throne, which must have been derived from some distant country, although how it was conveyed to the place is now difficult to surmise. M. Vámbéry terminated his narrative with his arrival at Herat in October; the country to the north of which place he found in great disorder, owing to the revolt against the Affghan Yoke consequent on the death of Dost Mohammed.

M. Vámbéry said the motive which led him to undertake this journey into Central Asia was to study the affinity between his native tongue and the languages of Tartary. He accordingly went, in the first instance, to Constantinople, and remained there four years, finishing his studies in the Turkish, Arabic, and Persian languages. After a short preliminary excursion, returning to Teheran, he met with 24 dervishes or holy pilgrims who were on their way from Mecca to their own country, Yarcand in Chinese Tartary. He presented himself to them as a dervish who had a strong desire to travel into Central Asia, in order to see the tomb of a very holy man. His dress and the colour of his skin excited their incredulity; but having overcome that by his representations, and by quoting verses from the Koran, he cast off his European clothing, assumed the ragged garb of a barefooted dervish, and furnished himself with the pilgrim's staff and with a copy of the Koran. He travelled with these people across the desert to Khiva, thence to Bokhara and to Samarcand. They first arrived among the Turcomans, on the eastern shores of the Caspian Sea. These people were great robbers, and in no part of the world was slavery so rampant as among them. He was obliged to have recourse to falsehood, in order to parry their suspicions that he must be either a Russian or an English spy; and when he had convinced them that he was really a dervish, the people came and asked him for his blessing. M. Vámbéry described the character of the Turcomans as a compound of great liberality and hospitality on the one hand, and of great tyranny and cruelty on the other; and he related some amusing instances of plundering which occurred while he was in the country. He stopped among the Turcomans a month, and then hired a camel and started for Khiva. They found the journey a most difficult one, for they were 22 days without fresh water, and the heat was intense. In addition to this, he had to undergo the misery of performing a great part of the journey on foot, rather than encounter the abominable smell of a buffalo-calf, which was slung on the other side of his camel. Khiva had been visited before he went there by Captain Abbott and Mr. Thompson, who was sent on a special mission by the English ambassador at Teheran. It is a very small town, about half the size of Bokhara. When he went into the streets his features excited the greatest suspicion; he was regarded as either an English, a Russian, or a Persian spy, and they tried to arrest him. To prevent this, he went to the first Minister of the Khan, who had been a long time at Constantinople, and induced him to give out that M. Vámbéry was a true Mollah, of great repute, from Constantinople. The Khan being assured of this, sent and importuned him for his blessing, and, when he had received it, wept for joy, declaring that he had had a dream that a holy man from Constantinople would come and bless him. From Khiva they went to Bokhara, taking the left shore of the Oxus. They were told that the Turcomans were coming to plunder them, and that they had better make their escape into the desert. They went into the desert; but they had not sufficient time to take water with them, and some of the days he passed there were the most frightful he had ever spent in his life. It was the first time he had seen a man die of thirst; the poor man's tongue and face became black as ink. The second day he saw in a looking-glass little black stains on his own tongue, and he was naturally very much alarmed; but happily, his life and the lives of the rest of the party were spared, and they entered Bokhara with

a caravan of 16 camels. Their arrival was welcomed by the people, and they were introduced into the convent where holy men tarry. His appearance again excited much suspicion, and he was threatened with death by the vizier of the Khan, if he did not confess that he was a dervish in disguise. By a display of assurance and tact, claiming to be a renowned dervish, and holding out threats of punishment in this world and in the next, he succeeded in inspiring the vizier with a dread of him. After staying a month at Bokhara, they went to Samarcand, the route abounding in villages and towns. In some places, particularly after having passed the little desert named Malek, villages occurred every quarter of an hour of the journey, either on the line of march or a short distance from it. Much had been said of the renown of Samarcand as the capital of Timour; but the ruins he met with did not seem to justify its former reputed magnificence. There are, however, remains of ancient colleges which are very interesting. During the reign of Timour there was one built at great expense in the Persian style, with a portico, still remaining, about 80 ft. or 100 ft. high, consisting of elaborate mosaic work inlaid in the form of thousands of coloured roses and other objects of beauty. At Samarcand stands the second observatory that was ever built in Asia, erected by a grandson of Timour; and also the summer-palace of Timour, in which is an immense green stone supporting the throne, transported from Broussah, but by what means it is impossible to tell. The tomb of the King is also very interesting. In the upper part there is the tomb of Tamerlane, the great conqueror; next to him lies his first teacher, and around him are his children. There is a lower part which is an exact imitation of the upper part; there is no figure, no stone, no rose in the upper part which is not repeated in the lower part. In the lower part is contained the Koran, said to have been written by the hand of the second Caliph on the skin of a gazelle, and brought by Timour from Broussah to Samarcand. He remained 10 days at Samarcand, and looked everywhere, but could discover no traces of the great Library which was spoken of in the work of a French writer. From Samarcand he returned to Karshi, and thence to Herat. At Herat he thought himself safe, because in the streets he saw red-coated soldiers being drilled in the English manner, and he began to speak a little more freely. Being in want of money to continue his way to Mushed, he went to the palace, where he found the son of the King attended by his Vizier. He told him he was a poor dervish and gave him his blessing, and expressed a wish to sit down at his side; but, as the Prince made no place for him, he pulled the Vizier away, and took his seat next to him. The Prince looked at him and exclaimed, "By Heaven, I swear you are an Englishman!" He denied that he was, and he recited some verses from the Koran; at length, the Prince believed him and gave him some money. He stopped at Herat, and then started for Mushed, which is on the frontier of Persia; from which place he wrote a letter to the Prince, telling him that he was not an Englishman but very nearly an Englishman, and cautioning him not to molest people passing through his country.

At the invitation of the President, M. Vámbéry explained that there are different kinds of blessings practised by the dervishes; one called the "blessing on foot," another "the blessing on horseback." The blessing consists of verses of the Koran. The man who blesses stands upright, with his hands held high; and after having blessed he strokes his beard with his hands, and those who receive the blessing do the same, in token that it has been accepted.

Sir H. RAWLINSON said M. Vámbéry had conferred a very great benefit upon geographical science; for all these adventures of his, which he had so amusingly described, were but a means to an end. Like many Hungarian scholars before him, he was greatly interested in the origin and history of his race, one of the most interesting questions relating to the ethnology of Europe; and with the view to ascertain these, he had gone through years of toilsome

hardship and prolation, in order to qualify himself for travelling in the East and prosecuting his researches. It was a remarkable thing that a European gentleman should be able to pass through a Mohammedan college, and become so competent an Arabic scholar that clever men of the Mohammedan religion should not be able to detect that he was not one of themselves. As far as Teheran, hundreds of people had passed over the same ground; but from Teheran M. Vámbéry went into a comparatively *terra incognita*. The country through which he had been travelling was interesting in a twofold point of view. In the first place, it was interesting as a newly-explored region; and in the next place, it possessed great political interest from being the debatable land between the two great Asiatic empires, the Russian empire on the north and the Anglo-Indian empire on the south. Many gentlemen present would remember that twenty-five years ago great alarm was felt in England at the extension of Russian influence towards our Indian frontiers, and fears were entertained that Russia had designs upon India. That feeling, which brought about the Afghan war, had passed away, and had been succeeded by a feeling in the contrary direction, and we were as supine now as we were alarmed then. It seemed to be very little known that during these twenty-five years, while we had been imagining that all was quiescent, a most important change in the two frontiers had been going on to the extent of many hundred miles. Twenty-five years ago the Russian frontier was marked by the northern limit of the Kirghis deserts, and the English frontier was the Sutlej. At the present day the Russian frontier comes down to the Aral Lake, the Jaxartes River, and the Oxus; while the English frontier embraces the whole of Scinde, the whole of the Punjab, and crosses the Indus to Peshawur; so that at present there is only five or six hundred miles between the two frontiers. In speaking of the extension of Russian territory, he attributed no hostility against England, or anything reprehensible on the part of the Russian Government. It is a sort of law of nature, stated to be such by the late Sir Robert Peel, that when civilisation impinges on barbarism, the latter must give way. The subject, however, ought to be interesting to the English public; and in this point of view M. Vámbéry was deserving of our commendation for having made us acquainted with these regions, pregnant with so much political importance to us. With respect to M. Vámbéry's journey, he believed no European had ever passed from the Caspian at Astrabad to Khiva. Arthur Conolly endeavoured to pass by that line, but he only advanced three days' journey from Astrabad, and was obliged to turn back; and since that time he had never heard of any one attempting the whole route. Khiva itself has been visited by many travellers—by Captain Abbott, Captain Shakespeare, and also by Mr. Thompson; and very recently by Colonel Ignatief, son of the Governor of St. Petersburg, who conducted a mission to Bokhara and stopped a considerable time at Khiva: but M. Vámbéry had followed an entirely new route. His visit to Samarcand is also new. There is a tradition that an Englishman of the name of Gardiner visited Samarcand about twenty-five years ago, and left some extraordinary journals and memoranda, which were in the hands of Burnes when he was killed, and which were afterwards published in the Journal of the Asiatic Society of Bengal. But the portion relating to Samarcand is entirely lost; so that M. Vámbéry may fairly claim the honour of having been the first European who had lived in Samarcand and described it since the days of Clavijo, who visited it in 1404. Andekoï, which he visited on his return journey, is a place of interest to Englishmen, because it was there that Moorcroft, the pioneer of English travellers, was taken ill, and died. Then the route from Andekoï to Herat is through a difficult tract of country. Many of our travellers have passed to Herat by Mushed. Conolly, in his last journey, passed from Cabul direct to Merv, and left a very good account of the route. Sir Henry Rawlinson added that he felt some personal interest in the circum-

stance, because it so happened that he was appointed joint envoy with Colonel Conolly, and it was only by mere accident that he did not accompany him on the journey, which ended, as they were aware, fatally to that officer. He would only say, in conclusion, that with all his experience of the East, he considered that M. Vámbéry had achieved something exceedingly remarkable. He doubted whether there was one European in a thousand who would successfully pass three years of probation among bigoted Mohammedans. At Bokhara M. Vámbéry lived with his life in his hands, for at any moment he was liable to have his head cut off. The fate of Stoddart and Conolly proved that. M. Vámbéry seemed to be doubtful about the fate of those Italian merchants who had gone to Bokhara to obtain the eggs of the silkworm; but, according to the last accounts which he had received from a member of the Russian embassy in London, they have been killed. The Ameer appealed to the Russian Government to know if they were Russians, and the Russian Government replied they were not. They were then asked if they were English, and they said they were not. The Ameer said they must be Englishmen, because there were no other Europeans but Russians and Englishmen, and upon that they were executed. He had been informed, however, that the Sardinian Government had sent a mission to Bokhara to search for them; and a gentleman had just mentioned to him that one of our naval officers returning from China travelled with this mission, quite recently, nearly up to the Bokharian frontier. He mentioned these circumstances to show what danger there is to an Englishman living in Bokhara. M. Vámbéry went through all the difficulties and dangers from a real love of science; and although he was not able to take astronomical observations, yet he had brought back a considerable amount of information with regard to the geography, the statistics, the languages, the antiquities, the commerce, and the social condition of these countries, which that prince of publishers, Mr. Murray, is at present occupied in putting together for publication.

Dr. WORTHINGTON said his friend Dr. Wolff, whose papers were in his possession, passed over a large portion of the ground which had been traversed by Mr. Vámbéry. He went from Teheran to Mushed and Khiva, and his adventures were precisely similar to those which this Hungarian gentleman had related. He spoke of the Turcomans in the same terms—of their barbarism and rudeness, and of slavery existing among them. In his time there were 40,000 slaves in that country. Another point that would be interesting to M. Vámbéry, in connection with the affinity between the Hungarian and Polish and Tartar races, was, that there is a town, Shamay in Chinese Tartary, which, in Dr. Wolff's time, contained 300 Polish families. The country in question is full of interest, as the birthplace of the great conquerors of the human race; for Timour and Genghis Khan both proceeded from the country of the Turcoman.

Lord STRANGFORD observed that Dr. Wolff was never in Khiva in his life. The route he took is a comparatively well-known one, across the desert from Mushed to Bokhara, and he returned from Bokhara by precisely the same way. M. Vámbéry took an entirely different route, by way of Astrabad. Conolly went that way, but he had to return, and he had the greatest difficulty in escaping with his life. M. Vámbéry went to Khiva over perfectly new ground; from Khiva to Bokhara again over perfectly new ground; and from Bokhara to Samarcand, a city that had not been visited by a European for several centuries. He did so with his life in his hand; and he only maintained his life by his extraordinary acquirements and accomplishments and his indefatigable enthusiasm.

Dr. WORTHINGTON understood, by Dr. Wolff's having described Khiva in the account of his second visit, that he had been there.

Mr. DRACH stated that he believed there was a copy of the Koran, similar to that described by M. Vámbéry, in the Library of the India House.

Sir H. RAWLINSON said he himself obtained that copy of the Koran from a pilgrim from Samarcand, who was in great distress; and he sent it to the Library of the India House. He believed it was a fellow-copy to that which M. Vámbéry saw at Samarcand, and that neither of them was really older than the second or third century of the Hegira.

Mr. MARKHAM said that an interesting point in M. Vámbéry's journey was the fact that, previous to his visit, Samarcand had never been described for 450 years, when Ruy Gonzales de Clavijo, the Spanish Ambassador, visited it. The account he gave of the Turcomans corresponds exactly with that given by M. Vámbéry. But there was a great difference in the way in which the two travellers performed the journey from Persia to Samarcand. M. Vámbéry perished, suffering from thirst, and in great danger of his life. The Spaniards were in no danger of life, but they suffered from the frightful haste in which they had to travel. Timour was excessively anxious that they should arrive at Samarcand in time for a festival in honour of his eldest son. When they reached Teheran, orders were issued to travel on horseback day and night to Samarcand. One of the party died on the road, and Ruy Gonzales reached Samarcand quite worn out. He was then made to eat and drink to such excess that he was nearly killed. It appeared that all classes, from Timour downwards, drank in the most frightful way, and were drunk every night. He was asked to dine with the queen, who was horribly drunk, and, as Ruy Gonzales never touched wine, he was in the greatest possible distress all the time he was there. Samarcand then had a very different appearance from what it now presents. There were beautiful gardens, very fine buildings, and elephants engaged in carrying stone. It had not, however, attained the height of its prosperity, and the observatory built by the grandson of Timour had not then been commenced. Samarcand is now in ruins, and the interval of 450 years which has elapsed since the visit of Clavijo, during which no European traveller has seen the place, alone gives great importance to M. Vámbéry's journey.

The PRESIDENT understood there was a gentleman in the room, Mr. Michell, who could contradict the report respecting the death of the Italians.

Mr. MICHELL said that when he was in St. Petersburg, ten days ago, he heard on very good authority that a second firman from the Sultan of Turkey had arrived at Bokhara, the first having been stolen on the Russian frontier, and that the Italian gentlemen were on their way back to Persia. There was another point on which he wished to make an observation, and that was the commercial aspect of the question. Bokhara is a great cotton-producing country; and an immense quantity of Bokharan and Khiva cotton has found its way to England, being exported from St. Petersburg. It has been used in some of the mills. The Russians are doing what they can with proper machinery towards teaching the natives to prepare the cotton in a better way than they do at present, and in a year or two it will be quite available for common use; it does very well mixed with American cotton.

Mr. CRAWFORD thought we should never get any cotton from Bokhara worth speaking of. The price of cotton is threefold what it formerly was; therefore he was not surprised that cotton should arrive from Bokhara, India, and other places. He was glad to hear Sir Henry Rawlinson express the opinion that there is not the least danger to India from the advances of Russia. He never thought there was the slightest danger, and he was sure that neither country could do the least harm to the other. Five-and-twenty years ago he protested against the Affghan war; and he might mention that, at the very time we were engaged in that war, the Russians made an attempt to punish the Khan of Khiva, and they lost 30,000 men in the operation. Now, if they could not advance 300 miles into the interior without incurring such a loss,

how would it be possible for them to send an army 4000 miles to India? It will always be far easier for us to send an army from the banks of the Thames to the banks of the Indus than for the Russians to send an army from their frontier to Peshawur.

Sir H. RAWLINSON said this cotton question is really one of some consequence with regard to the Russian supply. There is no doubt that Russia draws the greater portion of her supply from Central Asia. M. Vámbéry had not touched upon the commercial part of the question; but it should be remembered that the real rivalry between us and Russia in Central Asia is in commerce, and not politics. At present, he gathered both from our own Trade Returns and from Mr. Lumley's Report on 'The Trade of Russia with Central Asia,' that we are entirely driven out of the market. M. Vámbéry would tell them that in Khiva, Bokhara, and Samarcand, he saw nothing but Russian goods. It is a peaceful and an honest rivalry, and as long as it is confined to that, we have no right to complain of Russia.

M. VÁMBÉRY confirmed this statement of Sir Henry Rawlinson, and added that he was informed that 8000 camels annually enter the different towns laden with Russian goods.

The PRESIDENT congratulated the Meeting upon the discussion, and expressed his concurrence in the opinion of Sir Henry Rawlinson that the advance of the Russians could not be in any way detrimental to our great Indian empire. He might remind his friends that long before we had any empire in the East, the Russians had intercourse with Bokhara. Surely, then, we could not be jealous of Russia trading with a nation that she had traded with for hundreds of years. So far as the subject had been touched upon, he thought it would do a great deal of good; as showing that both nations, by advancing their frontier and approximating to each other, only tended to civilise barbarous regions, and to bring savage nations under a regular system of government.*

3. *On the Comoro Islands.* By Captain ALGERNON DE HORSEY, R.N.

THIS paper contains a description of the little-known group of islands called Comoro, lying between the northern end of Madagascar and the African coast. The largest of the group is only 35 miles in length by about 12 miles in breadth. It is remarkable as possessing a lofty isolated mountain, 8526 feet in height. Many interesting details, both of the physical geography and ethnology of the group, are given by Captain de Horsey, which it is unnecessary to repeat here, as his paper will be published entire in the 'Journal.'

* M. Khanikoff has sent the following note, vindicating his claim to have visited and described Samarcand long before M. Vámbéry's journey:—

"I arrived at Samarcand the 2nd (14th) of September, 1841, and remained there up to the 20th of the month. My travelling companion, the late naturalist Lehmann, arrived two days after me, and remained there for three weeks. We have both published very full descriptions of the capital of Tamerlane, and I also caused an exact plan of the place to be drawn up by the topographer Yakowlef, who accompanied me. This plan, on the scale of 1 verst (3500 English feet) to an inch, is annexed to my description of the Khanat of Bokhara, translated into English by M. de Bode. The English editor, it is true, would not go to the expense of reproducing the plans and maps; but the Russian edition, in which they appear, is to be found in the British Museum library. The description of Samarcand, drawn up by M. Lehmann, was published in German, by Messrs. v. Baer and v. Helmersen, after the death of the author, in the 'Beiträge zur Kenntniss des Russischen Reiches,' Vol. 17."

ADDITIONAL NOTICES.

(Printed by order of Council.)

- 1.—*Extracts from a Memorandum on the Country of Azerbaijan.* By
KEITH E. ABBOTT, Esq., H.M. Consul-General in Persia.

[Communicated by the FOREIGN OFFICE.]

THE country known to the Persians as Azerbaijan is divided between them and Russia, the latter Power possessing about five-eighths of the whole, which may be roughly stated to cover an area of about 80,000 square miles, or about the size of Great Britain; 50,000 square miles are therefore about the extent of the division belonging to Russia, and 30,000 of that which remains to Persia. The Russian division is bounded on the north and north-east by the mountains of Caucasus, extending to the vicinity of Bâkou on the Caspian. On the west it has the provinces of Imeritia, Mingrelia, Gooriel, and Akhiskia (now belonging to Russia); on the east it has the Caspian Sea, and on the south the boundary is marked by the course of the River Arrass (Araxes) to near the 46th parallel of longitude, thence by a conventional line across the plains of Moghan to the district of Tâlish, and by the small stream of Astura which flows to the Caspian through the latter country. In this area are contained the following territorial divisions:—Georgia or Goorjistan, comprising Kakhetty, Kartaliny, Somekhetty, Kasakh; the Mohammedan countries of Eriwan, Nakhshewan, Karabâgh, Ghenja, Shirwan, Shekky, Shamachy, Bâkou, Koobeh, Salian and a portion of Tâlish.

Georgia is traversed by the River Koor (Cyrus), a stream of no commercial importance, since it is not navigable except by boats. After being joined from the north and south by many small tributaries, it unites its waters to those of the Arrass, a few miles above Salian, and flows to the Caspian. The Arrass which forms the principal line of boundary between the Persian and Russian possessions is likewise of no importance commercially, and its waters become very low in autumn.

A fresh-water lake (slightly brackish) of considerable extent, and surrounded by lofty and bleak mountains, is situated in the country of Eriwan. It is known as Lake Ghôkcheh, and abounds with trout of a large size. A small island situated near the western shore possesses an ancient Armenian monastery known as that of Sevênn. The climate of this lake is cold and variable. Winter sets in early, and the road lying along the western shore and carried by the edge of deep precipices is one of great danger to travellers at that season. On the same shore is found a colony of Mallekkans, Russian sectarians who have been persecuted by their Government and are kept here in permanent banishment. I believe that they may be regarded as reformers; they are dissenters from the Russo-Greek church, and one of their principles is the rejection of picture-worship. There is also a colony of Jews there.

Some miles beyond the Lake of Ghôkcheh, on the north, commences the great descent by the Pass of Dilijan through a broad strip of wooded mountain country. Here the sides of the descent are clothed with fir, oak, beech, elm, and other trees. The Pass extends through about 36 miles of descent, at first very abrupt; the road, though not good, affording very charming pictures of greenwood scenery.

Tiflis is the capital of all the Russian possessions south of the Caucasus. The old town is said to date from 469 A.D., and possessed a fort on the heights. The modern or Russian town is already a handsome place and yearly increasing in size; but it possesses no object of especial interest. There are hot springs used for public baths. The summit of the Kazbeg, the second highest peak of the Caucasus, is seen from the streets, and the Koor flows through the place in a deep channel and rapid stream of width varying, probably according to the season, from 100 to 200 yards. The population of Tiflis is credibly estimated at 70,000 or 80,000 souls, a mixed race of Georgian Christians, Russians, Armenians, and Mohammedans. Its climate is oppressively warm in summer, and fevers of a malignant kind are prevalent at that season and in early autumn. In winter it is variable, with cold searching winds. The city has now apparently great chance of rising into importance. An electric telegraph has been established between it and Poti on the Black Sea, and the line is being carried on to the Persian frontier of Azerbaijan. A fine macadamized road, leading for a great distance over very mountainous and difficult country, has been established between the Black Sea and Tiflis, and the scheme of a railway for the same line is under consideration; and English engineers employed for the survey regard it as practicable, though at a great cost. The productions of Georgia Proper appear to be of limited importance, serving only for local consumption; and such indeed is the general poverty of the Russian Trans-Caucasian districts, that they do not produce sufficient for their thinly-scattered population augmented by the presence of the Russian troops. The latter are therefore supplied with food from Astracan.

Dense forest commences at some miles north of Tiflis, and extends to the mountains of Daghestan, and the country west of the city is more or less wooded to the confines of Imeritia, which, with its sister provinces of Mingrelia and Gurriel, is occupied to a great extent with deep jungle.

The population of Russian Azerbaijan consists of mixed races, Mohammedan and Christian, amounting probably to 700,000 or 800,000 souls. Georgia Proper is chiefly occupied by Christians of the Greek Church, but Armenians are scattered among them and over all the Russian possessions south of the Caucasus, being numerous in Nakhshewan, Karabagh, and Akhiská. This estimate of numbers does not include the inhabitants of the mountains of the eastern and western Caucasus, on which subject little is known. The Mohammedans are principally of the Shieh sect, are much divided, as in Persia, into tribes, and have been with some difficulty kept in subjection by the Russians, though there is now little chance of their ever emancipating themselves from the yoke of their present rulers.

Persian Azerbaijan extends southwards to the range of mountains known as the Káflan Kooh. On the west side it has the Ararat or Byazeed frontier, the pashalik of Van, and the lofty mountains of Koordistan; whilst on the east are Russian and Persian Tálísh, and a range of mountains commencing at about the 39th degree of north latitude, and extending southwards to the 36th degree, where, sweeping to the east, it stretches across Arák and Khorassan in nearly an unbroken chain, blending with the loftier range of the Hindoo Koosh of Afghanistan, and may thus be said to be continuous with the Himalaya. It will be seen that this range, starting from the point above mentioned, shuts in the low wooded countries of Tálísh, Gheelan, Mazenderan, and Asterabad, lying on the Caspian, from the upland or elevated country of northern and central Persia.

The country included in these boundaries, and perhaps a large part, if not all, of Russian Azerbaijan, is generally recognised as the Medea Afropatena of ancient geography. The principal districts of Persian Azerbaijan are as follows:—Tabreez, Khoee, Oroumieh, Marágha, Soorek Bonlágh (to which belong Serdusht and Sayn Kaleh), Ardebul and Mishkeen, Khalkhál.

The country of Persian Azerbaijan consists of an elevated tract of mountain and plain, the latter being *various* varying from 4000 to 5000 English feet above the level of the *sea*. The elevated base spring the mountain-ranges, the loftiest point of which attains an elevation of 15,400 feet above the sea.

The city of Tabreez is situated at about 4330 feet above the sea, and some of the mountain-ranges, &c., are as follows:—

	Feet.
Serhund (highest point)	11,200
Passage across it to Marāgha	9,950
Hot springs of Leewan	8,370
Mount Savalan near Ardebul	15,400
Limit of cultivation on that mountain ..	8,200
Hot springs of Réaumur	5,530
Lake of Oroumieh	4,200*

The Lake of Oroumieh is the only extensive sheet of water in Persian Azerbaijan. It is about 80 miles in length, and has been computed to be about 300 miles in circumference, though this is probably an exaggerated estimate. The intense saltness of its waters is its most remarkable feature, and so great is its specific gravity, consequent thereupon, that the human body is quite buoyant in it. Its waters are supposed to contain no living creature excepting a kind of polype. Fishes which are carried into it by the rivers perish, yet it is the resort of great flocks of the beautiful flamingo, which, at certain seasons, cover its shores and may be seen wading far into the water, for the lake is very shallow at a distance from land.

Numerous islands and rocks are found in the lake, but none of them are inhabited by man. The most interesting, and one of the largest, situated opposite to Shishawan, is the *habitat* of large flocks of the mouflon, or wild sheep, the descendants of a colony introduced some years ago, by a Persian prince. There are also wild asses and oxen, from tame breeds, and an abundance of partridges. A great deal of rather low wood is found in the island, consisting of the benneh, or wild pistachio, and the sakkiz. A peninsula runs into the lake on its eastern side, in the shape of a huge mountain, known as Shāhee. It forms a Mahāl, or district of the province, and contains six villages. The only vessels found on this lake are three or four large, rudely and singularly-constructed boats, wedge-shaped, and with square sterns and flat bottoms, one mast, and a heavy cumbersome sail.

Tabreez, the capital of the province, and in every respect the most important city of the empire, is, in extent, probably now superior to Ispahan, and it is considerably larger than Teheran. No statistics exist of the population, which, at a rough estimate may be put down at 150,000. It consists of a walled city, in circuit about $3\frac{1}{2}$ miles, with very extensive suburbs. Its situation is at the south-eastern corner of a vast plain extending about 100 miles east and west, and is picturesque owing to the outline and formation of the mountains in its vicinity and the density of the foliage of groves and gardens; but the town in itself has nothing to boast of. Its bazaars, though extensive and well supplied, are in general narrow and meanly-constructed; its streets, as in all Persian towns, confined, irregular, and abounding in holes and inequalities. Filth of every kind is thrown into them, and those leading immediately along the ramparts present a spectacle at once of ruin and neglect, such as I suppose is not surpassed in any other eastern town. The city is surrounded by a dry ditch, a glacis, and a low wall, and a second or inner wall,

* I am indebted for most of the above observations of heights to the kindness of M. Khanikoff, a Russian gentleman of high scientific attainments.

and towers at about 50 paces back. The city has been frequently injured by earthquakes. I have known nine shocks to occur in one night.

Tabreez has now become the principal seat of commerce in all Persia, and is the mart from which nearly all the northern and midland countries are supplied with the produce and manufactures of Europe, conveyed to it chiefly by land-transport from the Black Sea. These have been estimated at as high a value as 1,750,000*l.* in the year, brought in about 87,000 packages or half mule-loads, the value of the portion from England being probably full three-fourths of the whole. Since the war in America has arisen, however, there has been a great falling off in the trade; English cotton manufactures being so much more difficult to procure and so much more expensive than before. The place contains about 3100 shops of all descriptions, 30 caravanseries occupied by merchants and traders, and about 40 others devoted to the accommodation of muleteers and their cattle. It is divided into 15 mahallehs, or principal wards, besides subdivisions, and possesses 9 city-gates. The population, as in other Persian towns, is for the most part Mohammedan, but about 330 families of Armenians are found there. The place is resorted to by a few Europeans having commercial or other interests there, and the governments of England and Russia have consuls-general established in it. It is also the seat of an Armenian bishopric depending on Etch Miazin.

Within the enclosure called the Ark rises a vast mass of very beautiful brickwork, erected by Aly-Shah, one of the viziers of the Cazan Shah (9th in descent from Chenghis), who flourished about the year 700 A.H., or 1300 A.D. The building was originally a mosque, and had a dome, which has long since fallen in, the consequence of earthquakes, which have sorely tried the strength of this fine structure and rent it in two places. Almost the only remaining object of interest in the place, in the shape of a building, consists in the ruins of a beautiful structure known as the Blue Mosque, situated in one of the suburbs. The founder was Jehan Shah, chief of the tribe of the Black Sheep, and the 3rd sovereign of a small Tartar dynasty which reigned in the North of Persia for a period of 63 years. The building is said by one traveller, M. Tancoigne, to have been destroyed by earthquake in 1559. The ruin consists of the principal arched entrance, of fine proportions, and ornamented in the richest manner with the blue-glazed tile, famous in Persia, which is wrought in devices of white, black, and other colours, in excellent taste, and with Arabic inscriptions in large characters beautifully adjusted. Behind this building are to be seen some of the finest specimens of the Tabreez marble, or alabaster, in enormous slabs.

The vineyards in Azerbajjan consist of vast walled enclosures as large as English fields; the area within is cut up into deep trenches with corresponding banks, facing north and south, three or four feet in height. On the northern side of these banks the vines are planted, and when sufficiently grown are trained over to the southern side, where the fruit becomes more fully exposed to the sun whilst the roots are kept cool in the shade. About five years are required before any return is reckoned on from a newly-planted vineyard. The vine seems to thrive even in the poorest and sandiest soils; the great requisite being a sufficient supply of water. Long and straight lines of walk, cutting each other at right angles, divide the vineyards into so many quarters or sections, and fruit-trees and vines as standards are planted along them. Beyond the rich clustering of the grapes of many beautiful kinds and the profuse bearing of the fruit-trees, however, there is not much that is attractive in a Persian vineyard. This kind of cultivation is yearly extending itself, and the quantity of fruit produced in the orchards, vineyards, and fields is sufficient to provide the poorest of the population with a delicious adjunct to their meals, such as is unknown in most parts of Europe, and some of the fruits are preserved through the greater part of the winter. A great deal of

wine, of a very good quality when properly prepared, is made at Tabreez by the Christians and drunk by them and the Mohammedans. It is exceedingly cheap, costing about 4*d.* or 5*d.* a bottle. At some of the villages great quantities of dried fruits are prepared for Russia and other parts.

Undoubtedly the city of Tabreez has greatly increased in extent and population during the past thirty years, but it is thought that this has been very much at the expense of the surrounding districts, the population of which has to some degree been attracted to the city merely by the prospect of employment enjoyed where a large community of men is found. In the commerce of Tabreez has made great advances since 1830, a traffic having sprung up with Europe which had attained in 1860 to an amount eight times greater than in the former year, and though, in my opinion, it probably then reached the highest figure it is capable of, I think that in some other respects the prospects of the province are more encouraging than ever. In 1859 an electric telegraph was established between Tabreez and Teheran, which as a speculation has answered exceedingly well, and is understood to have repayed the outlay within the first year; though from its having been very carelessly constructed it is frequently rendered unserviceable. I have already alluded to the telegraph carried from the Black Sea to Tiflis and thence towards the Persian frontier of Azerbaijan, which is probably ere this completed, and the Persian Government has undertaken to connect the two lines by extending the former through the short distance which now separates them, so that, when completed, direct intelligence may be transmitted from Europe, *via* St. Petersburg, to Tabreez and Teheran by one uninterrupted line of electric communication. This must tell favourably on the commerce of the country, by giving increased rapidity and activity to affairs, and the various improvements which are going forward in the communications through the Russian Trans-Caspian line must also act advantageously on the condition and prosperity of the country. The country possesses every requisite for prosperity, excepting good government; a fine, healthy, and, during part of the year, bracing climate; varied agricultural productions, raised with comparatively little labour or expense in a genial and fertilizing temperature; mountains rich in metallic productions and coal, which have hitherto been little attended to, but which a more direct communication with Europe will some day bring into notice; and, finally, a hardy and intelligent race for its inhabitants, capable of being turned to any good account.

2. *The Western Shore of the Dead Sea, from Jebel Usdum to Ain Jidy.*

[Extracts from a Paper by Rev. GEORGE CLOWES, B.A., F.R.G.S., announced to be read at the Evening Meeting, 22nd February, 1864.]

THIS journey was performed early in the month of April, 1863, in company with four friends, under the guidance of Abu Dahūk, Sheikh of the Jehālin tribe of Arabs. The party reached the shores of the Dead Sea through the Wady ez-Zuweirah. A broad plain here stretches towards the water, across which they rode; Jebel Usdum, a narrow, saddle-backed ridge, lying in front, separated from the hills on the west. Whilst crossing the plain they observed dead trees standing in the water at some distance from the shore. With regard to these Mr. Clowes remarks, "I find from Mr. Grove's valuable article on the Dead Sea, in Dr. Smith's 'Dictionary of the Bible,' that Mr. Poole, in October, 1855, remarked the same thing. As this was at the time of the year when the water was at its lowest, it seems more than probable that a permanent rise in the level of the sea has taken place of late years." Arriving at the north-east angle of Jebel Usdum, the party reached the point where the mountain approaches within

30 yards of the sea. At this spot there is a heap of stones, a ruin called Um-Mzoghal, which is supposed by M. de Saulcy to be a portion of the remains of Sodom. Mr. Clowes here adds, "Although I feel great diffidence in expressing any decided opinion on such a subject, I must say that it is difficult to understand how M. de Saulcy arrived at this conclusion. The form of the ruin certainly does not tell the tale of its origin, for it is, as I have said, a mere heap of stones. I would venture to suggest that its position—at the very narrowest part of the shore between the Wady ez-Zuweirah and the south of the sea—seems rather to imply that it was simply a fortress erected for the purpose of obstructing the passage towards the north." About half a mile beyond Um-Mzoghal the party turned somewhat more to the south, their path lying along the base of the range of Jebel Usdum, which presents a rugged, water-worn surface, with huge masses of rock-salt projecting here and there beyond the coating of limestone. Mr. Clowes corroborates Dr. Robinson's statement as to the length of the mountain—5 miles. Returning again northwards, Mr. Clowes and his companions, after passing the Wady ez-Zuweirah, noted the rugged and worn appearance of the hills, the masses of rolled débris, and the rounded shape of the stones which are scattered over the shore; all which were to them so many signs that aqueous action, and not volcanic, has produced the peculiar formation of these western hills and valleys.

To the north of the Wady ez-Zuweirah the party noticed the existence of three distinct parallel beaches, the highest lying at least 50 feet above the level of the sea. It was impossible to trace them for any great distance in a continuous line, on account of the constant interruptions caused by the débris from the heights above and by numerous watercourses: sufficient, however, was at times visible between this place and Ain Jidy to remove all doubt that the Dead Sea was once much higher than at the present time, and therefore that the old idea of the Cities of the Plain being submerged is untenable. The principal object of interest for some distance south of Sebbeh is the peninsula adjoining the opposite shore. It presents the appearance of an ordinary mud-bank, the western extremity of which is elevated only a few feet above the level of the water. "It is an ascertained fact," says Mr. Clowes, "that the principal part of this peninsula is composed of the same material as the beach opposite, beneath Sebbeh. That the channel which runs between the two is gradually becoming silted up by the soft deposit which the winter torrents carry down into it, seems beyond a doubt. The jagged edge of the peninsula, the increasing width of the bank between its high ground and the sea, and the shallowness of the channel, all point to such a conclusion. It must be remembered that the water was now at its highest, the line of drift-wood being a very short distance from it, so that later in the year the channel must be much narrower, and the bank of mud or sand much wider." Specimens of earth from the opposite shore (the same earth as that of the peninsula), brought home by Mr. Clowes, were analyzed by Dr. Price for Mr. Grove, and found to contain 6·88 per cent. of salts, soluble in water, viz. :—

Chlor. Sodium	4·559
„ Calcium	2·08
„ Magnesium	0·241

Bromine was distinctly found.

Opposite the northern portion of this strange tongue of land is the rock of Sebbeh. The party halted on the southern side of the hill, close to the remains of a Roman camp. A narrow ridge joins the rock on the west to the other mountains, and by this alone is it accessible. Towards the top of Sebbeh there are evident signs of the rocks having been cut away, for the purpose, no doubt, of rendering the approach more difficult. The ruins of the Roman camps appear almost perfect. There is one on the east, and another on the north-

west. In many places the walls, which are built of loose stones, are still standing to the height of 4 or 5 feet. The view from Sebbeh was extremely fine. Far away to the north lay the dark line of the Jordan, bounded on either side by plains of sand. On the south was the Ghor. Between these were spread out the calm waters of the Dead Sea, reflecting as perfectly as a mirror the rugged outline of the Moab Mountains. With the exception of the north-west corner, the whole extent of the sea was visible from this point. A slight haze floated over the eastern mountains. The day was fine, and the desolation and scarcity of life, animal and vegetable, were forgotten. On wet days the prospect is very different, for it is impossible to describe the awful gloom which then hangs over the sea, justly called the Dead.

At a place half a mile south of Ain Jidy, Mr. Clowes, whilst bathing and trying the buoyancy of the water, found that he was being carried by a strong current in a northerly direction. He suggests that this may either have been an eddy caused by the influx of the Jordan, or a movement produced by a spring in the bed of the lake. The analysis of a bottle of water collected at this point countenances the latter idea; for he had fortunately the means of comparing it with that of a portion collected two days previously, from the north of the lake.

	Collected April 9th ½ mile S. of Ain Jidy.		Collected April 7th from North Shore.	
Specific gravity	1.1674	.. ..	1.1812	
Percentage of salts	20.54	.. ..	21.585	
Boiling point	106° 5 cent.	.. ..	108° cent.	

"These analyses" concludes Mr. Clowes, "show that the water collected by me was less dense, and contained a smaller percentage of salt, than that obtained two days previously at the north. The temperature of the water was 75° Fahr., that of the air certainly less; but I neglected to take it. These facts strike me as most interesting in connection with the question whether the supply of water from the known sources is sufficient to counterbalance the enormous evaporation constantly going on."

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